S.C. Department of Health and Environmental Control

# RECORD OF DECISION

## WIX DILLON FACILITY

### DILLON COUNTY, SOUTH CAROLINA

VCC 13-5996-RP

PREPARED BY:

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

BUREAU OF LAND AND WASTE MANAGEMENT

July 2018

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## Part I – THE DECLARATION

### 1.0 Site Name and Location

The Wix Dillon Facility is located at 1422 Wix Road in Dillon, South Carolina. The Site (Figure 1) is located in an area of mixed industrial, residential and agricultural use in Dillon, South Carolina, and consists of approximately 80 acres of land. Fifteen acres of the property, located to the north and east of the manufacturing building, are leased to a local farmer. According to facility personnel, Progress Energy owns and operates a power substation on approximately 4 acres of land in the northeast portion of the Wix property. The property is bordered to the north by farmland and the Franco Manufacturing facility on Scottland Road, to the east by cultivated and wooded farmland, to the south by farmland and a small number of residential properties, and to the west by the SCX Transportation railroad line and a residence small business. There are no occupied structures within the footprint of known impacts to groundwater.

### 2.0 Statement of Basis and Purpose

This Decision Document presents the Selected Remedy for the Wix Dillon Site. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for the Wix Dillon Facility.

### 3.0 Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances into the environment.

### 4.0 Description of Selected Remedy

SCDHEC has selected a remedial alternative for soil and groundwater contaminated with toluene and minor concentrations of other volatile organic compounds (VOCs). The selected remedial alternative uses multiple treatment methods to achieve site cleanup. Soils saturated with toluene will be excavated and disposed off-site. The excavation will then be backfilled with permeable material such as gravel, and an extraction well will be installed in the backfilled area. An Aggressive Fluid/Vapor Recovery (AFVR) event will be conducted to remove additional contaminant mass from the subsurface, followed by monitored natural attenuation (MNA). Additional AFVR events may be required if MNA is not effective.

## 5.0 Statutory Determination

The Selected Remedy attains the mandates of CERCLA Section 121 and to the extent practicable the NCP. The remedy is protective of human health and the environment, complies with applicable or relevant and appropriate requirements (ARARs), is cost effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also satisfies the statutory preference for treatment which permanently and significantly reduces the toxicity, mobility, and volume of hazardous substances, pollutants, or contaminants as a principal element of the remedy.

## 6.0 Authorizing Signature

This ROD documents the South Carolina Department of Health & Environmental Control's selected remedy for soil and groundwater at the Wix Dillon facility.

Donald L. Siron, P.G., Assistant Chief
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

7/13/2018
Date

## PART II - THE DECISION SUMMARY

### 1.0 Site Name, Location, and Description

The Site (Figure 1) is located in an area of mixed industrial, residential and agricultural use in Dillon, South Carolina, and consists of approximately 80 acres of land. Fifteen acres of the property, located to the north and east of the manufacturing building, are leased to a local farmer. According to facility personnel, Progress Energy owns and operates a power substation on approximately 4 acres of land in the northeast portion of the Wix property. The property is bordered to the north by farmland and the Franco Manufacturing facility on Scottland Road, to the east by cultivated and wooded farmland, to the south by farmland and a small number of residential properties, and to the west by the CSX Transportation railroad line and a residence small business. There are no occupied structures within the footprint of known impacts to groundwater.

### 2.0 Site History and Enforcement Activities

### 2.1 Site History

The facility was constructed in 1977 on agricultural land by the Dana Corporation. Plant operations from 1977 to present include the manufacture of fuel filters, oil filters, and air filters for automotive, diesel, racing, agricultural and industrial applications. Activities conducted at the facility include metal parts fabrication, element curing, assembly, painting, printing, packaging and shipment. Affinia Group acquired the facility in November 2004.

During the early years of manufacturing operations, toluene-containing paints were prepared in the southwest portion of the facility. Based on available information, it is believer that toluene was stored in an underground storage tank (UST) outside the building (Figure 3) and dispensed via a sub-grade piping network to various locations within the manufacturing building. After closing of the UST in the mid-1980s, toluene used in the paint formulation was stored in drums inside the paint room located in the southwestern portion of the building.

### 2.2 Previous Investigations

In October 2005, workers detected a paint-like odor in shallow soil material excavated during repairs to an underground water line west of the manufacturing building. Eight soil samples and three groundwater samples were collected and analyzed for volatile organic compounds. Analytical results for the soil samples indicated elevated toluene concentrations, with a maximum detection of 1,630 mg/kg. Toluene was detected in the groundwater samples from temporary monitoring wells at concentrations ranging from 7,610 ug/L to 184,000 ug/L. Other VOCs were detected at lower concentrations. An Environmental Site Assessment was conducted in 2006 to determine the nature and extent of contamination from the toluene release.

Two surface water samples were collected from a drainage ditch west of the area of contamination in May 2006. No VOCs were detected in either of these samples. No surface water investigation was conducted during the 2014 RI or 2015 RI Addendum. The closest natural surface water feature is a small unnamed stream located north of Scotland Road approximately 200 feet from the northwest corner of the Wix property.

Two sediment samples were collected from a storm drainage ditch west of the area of contamination in May 2006. Only one compound, p-isopropyltoluene was detected in one sediment sample at trace levels. No regulatory criteria have been established for this compound. P-isopropyltoluene is a naturally occurring aromatic compound, and is present in herbs such as thyme and cumin.

A Remedial Options Evaluation Report and Remedial Action Plan were submitted in 2008. Following pilot testing, an air sparge/soil vapor extraction (AS/SVE) system began operation in 2009.

Several years of monitoring indicated that the AS/SVE system was not reducing groundwater concentrations of toluene as expected. In 2013, Wix entered into a Voluntary Cleanup Contract (VCC13-5996-RP) with DHEC. Pursuant to the VCC, Wix conducted a Remedial Investigation in 2014, and RI Addendum in 2015.

### 2.3 Recent Activities

The RI confirmed that very high concentrations of toluene remained in soil (Figure 2) and groundwater beneath the Site. Additional groundwater monitoring wells were installed to determine the horizontal and vertical extent of the contamination. Trace levels of chlorinated solvent are also present in soil and groundwater at the facility. The RI Addendum was completed in order to evaluate the potential risk to site workers from exposure to chlorinated solvents in indoor air. An engineering evaluation of the existing AS/SVE system was also included in the RI Addendum.

Groundwater contamination has been identified in the shallow water table aquifer. In the vicinity of the former toluene UST, shallow groundwater is contaminated above the 1,000 micrograms per liter (ug/L) maximum contaminant level (MCL) as established by the Safe Drinking Water Act. The horizontal extent of groundwater exceeding the MCL for toluene is estimated to be 42,800 square feet. Benzene was detected above its MCL of 5 ug/L in a small area of the toluene impacted portion of the shallow groundwater. Cis-1,2-dichloroethylene (cis-1,2-DCE) was detected above its MCL of 70 ug/L in one well located inside the manufacturing building.

Subsurface soils are impacted in an area of approximately 22,000 square feet around the location of the former toluene UST. In this area, toluene concentrations exceed the soil screening level for protection of groundwater. This is the level at which soil contamination would be expected to cause groundwater contamination above the MCL.

The 2014 RI included collection and analysis of three sub-slab vapor samples. Toluene was not detected above the USEPA's industrial Regional Screening Level (RSL) for air in any of the sub-slab vapor samples. However, benzene, ethylbenzene, 4-ethyl toluene, 2-hexanone, tetrachloroethylene (PCE), and trichloroethylene (TCE) were detected at concentrations greater than the industrial air RSLs. Ten additional sub-slab vapor samples were collected as part of the RI Addendum in 2015. Analytical results were evaluated in the HHRA. The results of the HHRA are discussed in the Summary of Site Risks (Section 7.0).

## 3.0 Community Participation

Public participation activities prior to the issuance of this ROD included publishing a Notice of Availability in the Dillon Herald, delivery of the Administrative Record to the Dillon County Library, the mailing of approximately 80 post cards to owners of surrounding properties and government officials, and posting the Proposed Plan and Administrative Record for the site on the SCDHEC website, Public Notices page.

All reports and documents that formed the basis for the selection of the response action are contained in the Administrative Record. The Administrative Record is available for review at the Dillon County Public Library and at the Department's Bureau of Land and Waste Management office in Columbia, South Carolina. The notice of the availability of these documents was published in the Dillon Herald on April 26, 2018.

The official public comment period was from April 26 through May 26, 2018. There were three formal comments submitted on May 25, 2018 on behalf of the Responsible Part (Mann + Hummel). These comments are presented and discussed in the Responsiveness Summary. One phone call was received from an area resident who had received a post card announcing the availability of the administrative record. Another phone call was received from the son of a property owner who is planning to build on land near the Wix Dillon facility. These calls are summarized in the Responsiveness Summary.

## 4.0 Scope and Role of Response Action

This action will be the final cleanup action for the Site. The proposed actions include removal of soils saturated with toluene. The proposed remedy will prevent exposure to contaminated subsurface soils, groundwater and air; preventing the further migration of contaminants from soil to groundwater; and restoring groundwater quality through the use of active treatment followed by natural attenuation. The proposed remedy will permanently reduce the toxicity, mobility, and volume of contamination at the Site.

## 5.0 Site Characteristics

### 5.1 Overview of Site Characteristics

Mann + Hummel presently owns the Wix Dillon facility, and leases portions of the facility to Progress Energy and to a local farmer. The manufacturing building overlies part of the groundwater contaminant plume. Groundwater contamination is limited to an area adjacent to the western edge of the manufacturing building.

Site contamination consists of an area of subsurface soil impacted by a release of toluene, and a larger area of groundwater impacted by the soil contamination. This area is limited to a portion of the Wix Dillon Facility property, and has been horizontally and vertically delineated. Semi-annual monitoring results indicate that the plume is stable. Figures 4 and 5 illustrate the extent of groundwater contamination in 2014 and 2017 respectively.

### 5.2 Geology/Hydrogeology

The Site is located within the Middle Coastal Plain of South Carolina. In the Dillon area, the Pliocene-age Duplin formation, consisting of sands and clays, outcrops at the ground surface (USGS 2014). The Duplin formation unconformably overlies the older Cretaceous-age deposits of the Black Creek Formation over much of its extent. Lithologically, the Black Creek Formation consists of gray to black lignitic clay with thin beds of fine-grained micaceous sand and thick lenses of cross-bedded sand. The shallow water table was encountered at a depth of approximately 2-3 feet below ground surface (bgs) within the Duplin formation during the RI, and represents the upper-most water-bearing zone at the site. The Black Creek Aquifer underlies the surficial aquifer and is the primary source of public, industrial and agricultural water in much or the Coastal Plain of South Carolina. The potentiometric surface of the Black Creek Aquifer is approximately 60 feet above mean sea level in the vicinity of the Site (SCDNR 2009). Groundwater flow in the Black Creek Aquifer is generally in an eastward direction toward the coast.

The following unconsolidated deposits were encountered in the subsurface (depths are approximate):

- 0-15 feet bgs: yellowish red, brown and gray soft clay
- 15-25 feet bgs: gray to light gray interbedded clay and sand
- 25-36 feet bgs: yellow to light gray poorly-graded sand with silt
- 36 feet bgs: black hard clay

During the RI, the water table was encountered between 2 to 3 feet bgs in soil borings, and 3.92 feet to 6.35 feet bgs in site monitoring wells. Historical data indicate that the depth to the water table can vary by as much as 7 feet at a given well location. Based on semi-annual monitoring data, groundwater levels are typically highest in the winter and lowest in the late summer. The average annual rainfall in Dillon County is approximately 46.86 inches. (South Carolina State Climatology Office).

Shallow groundwater flows generally westward toward the wooded area. Variability in groundwater elevations in the area around wells MW-1, MW-2, MW-3, and MW-4R probably reflects the localized influence of the AS/SVE system on the hydrologic conditions in the shallow subsurface. A significant and consistent downward gradient is present between MW-12 and MW-12-38 (MW-12-D). MW-11 and MW-11-36 (MW-11D) exhibit a consistent upward gradient of a smaller magnitude. Although no monitoring wells have been advanced into the Black Creek Aquifer on-site, data available from the SCDNR indicates that the potentiometric surface of the Black Creek Aquifer is more than 60 feet deeper than the surficial water-bearing zone. Therefore, it appears that the surficial water-bearing zone and the Black Creek Aquifer are not in direct communication.

Slug tests conducted during the RI yielded average hydraulic conductivities of 0.06 feet per day for shallow wells (MW-1, MW-3 and MW-13) screened in the clayey deposits, and 0.9 feet per day for deep monitoring well MW-12-38.

### 5.3 Nature and Extent of Contamination

The RI confirmed that very high concentrations of toluene remained in soil and groundwater beneath the Site. Additional groundwater monitoring wells were installed to determine the horizontal and vertical extent of the contamination. Trace levels of chlorinated solvent are also present in soil and groundwater at the facility. The RI Addendum was completed in order to evaluate the potential risk to site workers from exposure to chlorinated solvents in indoor air.

### 5.3.1 Soil

Surface soils are not a concern as the release occurred in the subsurface. Subsurface soils are impacted in an area of approximately 22,000 square feet around the location of the former toluene UST. In this area, toluene concentrations exceed the soil screening level for protection of groundwater. This is the level at which soil contamination would be expected to cause groundwater contamination above the MCL.

### 5.3.2 Groundwater

Groundwater contamination has been identified in the shallow water table aquifer. In the vicinity of the former toluene UST, shallow groundwater is contaminated above the 1,000 micrograms per liter (ug/L) maximum contaminant level (MCL) as established by the Safe Drinking Water Act. The horizontal extent of groundwater exceeding the MCL for toluene is estimated to be 42,800 square feet. Benzene was detected above its MCL of 5 ug/L in a small area of the toluene impacted portion of the shallow groundwater. Cis-1,2-dichloroethylene (cis-1,2-DCE) was detected above its MCL of 70 ug/L in one well located inside the manufacturing building.

### 5.3.3 Indoor Air

Indoor Air–The 2014 RI included collection and analysis of three (3) sub-slab vapor samples. The sample locations and results are illustrated in Figure 6. Toluene was not detected above the US Environmental Protection Agency's (EPA's) industrial Regional Screening Level (RSL) for air in any of the sub-slab vapor samples. However, benzene, ethylbenzene, 4-ethyl toluene, 2-hexanone, tetrachloroethylene (PCE), and trichloroethylene (TCE) were detected at concentrations greater than the industrial air RSLs. Ten (10) additional sub-slab vapor samples were collected as part of the RI Addendum in 2015 as shown in Figure 7. Analytical results were evaluated in the HHRA. The results of the HHRA are discussed in the Summary of Site Risks section.

### 5.3.4 Surface Water

Two surface water samples were collected from a drainage ditch west of the area of contamination in May 2006. No VOCs were detected in either of these samples. No surface water investigation was conducted during the 2014 RI or 2015 RI Addendum. The closest natural surface water feature is a small unnamed stream located north of Scotland Road approximately 200 feet from the northwest corner of the Wix property.

### 5.3.5 Sediment

Two sediment samples were collected from a storm drainage ditch west of the area of contamination in May 2006. Only one compound, p-isopropyltoluene was detected in one sediment sample at trace levels. P-isopropyltoluene is a naturally occurring aromatic compound, and is present in herbs such as thyme and cumin. No regulatory criteria have been established for this compound.

## 6.0 Current and Potential Future Site and Resource Uses

Current land use of the Wix Dillon Facility is commercial/industrial in the area of contamination, although approximately 15 acres on the eastern portion of the property is under agricultural use. Adjacent properties are zoned for residential, commercial/industrial and agricultural use. The reasonably anticipated future land use would remain the same.

Because soil contamination is limited to the subsurface, and is below the EPA industrial RSL, continued industrial/commercial use is appropriate. The VCC requires that Wix enter and file a restrictive covenant if Hazardous Substances in excess of residential standards exist at the Property after Wix has completed the actions required under the VCC.

Groundwater contamination from the toluene release is limited to a small portion of the facility and does not extend off the facility property boundary. Groundwater is not currently used at the facility, and groundwater use would be prohibited under the Declaration of Covenants and Restrictions.

Indoor air may be impacted by vapor intrusion from VOCs in the subsurface. While toluene concentrations did not pose an unacceptable risk during the RI risk assessment, traces of chlorinated VOCs present in sub-slab vapor may present an excess cancer risk to site workers. The calculated risk level is at the lower end of the EPA's risk management range ($2.01 \times 10^{-6}$) and is based on sub-slab vapor results rather than measured indoor air concentrations.

Site use does not present an exposure pathway to surface water or sediment. Surface water and sediment samples have not detected contaminants of concern above risk based standards for exposure.

## 7.0 Summary of Site Risks

As part of the RI, Wix conducted a baseline human health risk assessment (HHRA) to determine the potential current and future risks to human health. Soil and groundwater contamination are limited to the western portion of the subject property. The current use of this part of the property is industrial. Part of the northeastern portion of the property is leased for agricultural use. With respect to potential receptors, Onsite Facility Worker (Adult), and Onsite Construction and Utility Worker (Adult) exposures were considered.

The 2014 RI assessed the potential effects of exposure to affected soil, groundwater, and sub-slab vapor at the Site. Unacceptable risk was noted for utility/construction workers potentially exposed to toluene and cis-1,2-dichloroethylene (cis-1,2-DCE) in shallow groundwater and to benzene, toluene, TCE, and xylenes in trench air while conducting sub-grade work in the impacted area. In addition, the HHRA identified unacceptable risk for facility workers potentially exposed to concentrations of PCE and TCE in indoor air as a result of vapor intrusion into the manufacturing building. The evaluation of the vapor intrusion exposure pathway in the 2014 HHRA was based on three sub-slab vapor samples.

Given the limited set of sub-slab vapor samples, further assessment of the potential for worker exposure by vapor intrusion was warranted for the site. As part of the supplemental RI activities, ten additional sub-slab vapor samples were collected to further characterize the extent of VOCs in sub-slab vapor underneath the building and to better define the potential risk from vapor intrusion. Results from both the 2014 and 2015 samples were evaluated using updated vapor intrusion guidance released by USEPA in 2015. The maximum detected concentrations were used to calculate the potential for risks to facility workers from vapor intrusion. Based on this evaluation, the RI Addendum Report concluded that the total excess cancer risk due to inhalation was $2.01 \times 10^{-6}$. Total excess cancer risks less than $1 \times 10^{-6}$ are considered to be below the "point of departure" and generally do not require corrective action. Risks greater than $1 \times 10^{-4}$ are generally considered unacceptable and require corrective action. Risks which fall in between these levels are considered to be within the USEPA's "risk management range." Within this range, risk assessors and project managers utilize professional judgement to ascertain whether these risk pathways are likely to result in actual exposures, and to determine whether response actions could effectively reduce potential risks to acceptable levels.

The calculated excess cancer risk to facility workers from indoor air is based on the maximum concentration detected from 13 samples. Further, the chemical responsible for the majority of the risk (PCE) is not the major chemical of concern at the site. No source or release of PCE has been identified. Wix has indicated that PCE was used historically and is no longer used at the facility. Considering these factors, the Department has determined that sub-slab vapor sampling should be incorporated into the site monitoring program. It is not likely that the preferred remedy will reduce concentrations of PCE in soil beneath the building slab. However the results of future monitoring will be used to determine if additional response actions are necessary to address PCE.

DHEC's current decision is that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to reduce VOC concentrations in soil and groundwater to protect public health and the environment, and ultimately reduce contaminants in groundwater to below the MCLs.

## 8.0 Remedial Action Objectives

Remedial action objectives (RAOs) are developed in order to set goals for protecting human health and the environment. The goals should be as specific as possible but should not unduly limit the range of alternatives that can be developed. Accordingly, the following RAOs were developed for the Site:

1. Reduce toluene concentrations in source area soils to minimize potential migration to shallow groundwater.
2. Mitigate human health risks from the potential exposure of affected media at the site.
3. Demonstrate statistically significant decreasing concentrations of toluene in groundwater indicating the MCL will be met within a reasonable timeframe.

The proposed action will reduce the mass of toluene in soil. The site-specific target level, or remedial goal, for toluene in subsurface soils is 0.69 mg/kg. The remedial goals for groundwater contaminants are the MCLs established under the Safe Drinking Water Act.

**Table 1: Remedial Goals**

| Contaminant | Media | Concentration |
|---|---|---|
| Toluene | Soil | 0.69 mg/kg |
| Toluene | Groundwater | 1,000 ug/L |
| cis-1,2-DCE | Groundwater | 70 ug/L |
| Benzene | Groundwater | 5ug/L |
| Vinyl Chloride | Groundwater | 2 ug/L |

## 9.0 Remedial Alternatives

Based on information collected during the previous investigations and remedial system operation, a Focused Feasibility Study (FFS) was conducted to identify, develop, and evaluate more effective cleanup options and remedial alternatives. Both soils and groundwater were considered in the FFS. The table below briefly describes the alternatives that were identified and screened. Three alternatives were carried through to the final detailed analysis. A final Remedial Design will be developed prior to implementation.

- No Action Alternative: Evaluated for baseline comparison only, the No Action alternative would not include any remedial or monitoring measures. (Note: The No Action Alternative is not numbered herein to maintain consistency with the FFS).

- Alternative 1: Modified Air Sparging/Soil Vapor Extraction (AS/SVE); Dual Phase Extraction (DPE)
- Alternative 2: Excavation with Biosparging and MNA
- Alternative 3: Soil Excavation with Aggressive Fluid Vapor Recovery (AFVR) and MNA

All alternatives include land use controls (LUCs) (e.g. groundwater use restriction) on the property. It is assumed that the LUCs will remain in place until the groundwater remedial goals (RGs) are achieved.

## 9.1 Description of Remedial Alternatives

### 9.1.1 No Action Alternative

The regulations governing the Superfund program require the Department consider a No Action alternative. The No Action alternative serves as a baseline against which the other remedial alternatives can be compared. Under this alternative, there would be no action taken to prevent exposure to the soil contamination. No institutional controls or active remediation would be implemented under this alternative.

There would be no capital or operation and maintenance (O&M) costs associated with this alternative.

### 9.1.2 Alternative 1: Modified AS/SVE (Dual Phase Extraction)

AS/SVE is a treatment method that involves injecting air into the groundwater through drilled wells or driven points. As the VOCs in groundwater partition into the injected air, the VOC-laden air rises to the zone above the water table where it is removed by the SVE system. This process has been in use at the Wix site since 2009, and has not been effective in achieving RAOs. The 2015 Remedial Investigation Report Addendum included an engineering evaluation of the existing system which concluded that this technology was not well suited to site conditions due to a shallow water table and low permeability of the soils. The option of modifying the existing system to a dual phase extraction system was evaluated.

The existing AS/SVE system could be modified to a dual phase extraction (DPE) system. By dewatering the impacted area, this approach would allow for more effective delivery of air, and extraction of contaminant vapors. This remedial approach would involve repair and/or replacement of damaged and malfunctioning AS/SVE equipment, installation of groundwater extraction equipment, including extraction wells, pumps, piping, and construction of a system to treat extracted groundwater prior to discharge. Groundwater would be treated using a carbon filter to remove VOCs. A treatment trailer would be built to house the water treatment equipment. This alternative would include groundwater monitoring and reporting. Recovered vapors would be treated through vapor-phase carbon filters and then discharged to the atmosphere.

The project life of this alternative is estimated to be 15-20 years.

The net present value of this alternative is estimated to be $1,940,000.00.

#### 9.1.3 Alternative 2: Excavation followed by Biosparging and MNA

This combined technology would begin with excavation and offsite disposal of soils saturated with toluene. The excavated area would be backfilled with gravel (in lieu of native or borrow soil) to create a highly permeable treatment zone for groundwater containing residual toluene concentrations. A biosparge system, which combines bioremediation with AS/SVE, would be installed within the gravel backfill. The biosparge system would inject both air and nutrients in to the saturated backfill, and toluene-laden air would be collected by horizontal well screens placed in the unsaturated backfill. The nutrients would stimulate the indigenous toluene-oxidizing microorganisms and migrate with groundwater flow to areas beyond the biosparge system. The biosparge system would increase the footprint of active remediation. Monitored Natural Attenuation (MNA) would also be implemented to monitor the physical, chemical, or biological reduction of residual toluene mass at the site.

The project life of this alternative is estimated to be 5-10 years.

The net present value of this alternative is estimated to be $1,449,000.

#### 9.1.4 Alternative 3: Excavation followed by AFVR and MNA

This combined technology would begin with excavation and offsite disposal of soils saturated with toluene. The excavated area would be backfilled with gravel (in lieu of native or borrow soil) to create a highly permeable treatment zone for groundwater containing residual toluene concentrations. Stockpiled clean native soil or borrow soil would be used to backfill the upper 2 feet of the excavation area (0 to 2 feet below ground surface). A 4-inch diameter extraction well would be installed within the gravel backfill for AFVR application. AFVR is a physical treatment using a truck or trailer mounted mobile high-pressure vacuum system to extract groundwater and vapors from extraction and/or monitoring wells. The extracted vapors are treated onsite using a catalytic converter on the vacuum truck prior to venting to the atmosphere, while the extracted fluid is managed within a tank and transported offsite for treatment and disposal. The AFVR technology would provide supplemental removal of toluene mass from extracted soil vapor and groundwater. An initial AFVR event would be conducted to determine the effectiveness of the technology in removing residual toluene mass. Following mass removal via excavation and AFVR, MNA would be implemented to monitor the physical, chemical, or biological reduction of residual toluene mass at the site. If monitoring indicates that MNA alone is not effective, additional AFVR events may be required.

The project life of this alternative is estimated to be 7-10 years.

The net present value of this alternative is estimated at $797,000.

## 10.0 Comparative Analysis of Alternatives

The NCP requires the Department use specific criteria to evaluate the different remediation alternatives individually and against each other in order to select a remedy. Two of these criteria, overall protection of human health and the environment and compliance with State and Federal regulations, are threshold criteria. If an alternative does not meet these two criteria, it cannot be considered as the Site remedy. Five of the criteria are balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of contaminants through treatment; short-term effectiveness; implementability; and cost. These criteria are used to weigh the strengths and weaknesses of the alternatives. Community response to the preferred alternative and the other considered alternatives is a modifying criterion that was carefully considered by the Department prior to the final remedy selection.

The following section of the ROD profiles the relative performance of each alternative against the criteria, noting how it compares to the other options under consideration.

### 10.1 Overall Protection of Human Health and the Environment

The No Action Alternative would not be protective of human health and the environment. Potential for exposure of plant employees and on-site construction workers to contaminants would remain.

Alternative 1 would protect human health and the environment by mitigating exposures to contaminated soil and groundwater through deed restrictions and continued use of municipal water as a water supply source. Restoration of the impacted groundwater would also be achieved over time. Energy consumption and waste generation would be relatively high due to mechanical processes applied over the lifetime of the remedy. Based on the data gathered during operation of the existing AS/SVE system, it is anticipated that the modified system would operate for 15-20 years and have a limited radius of influence. During this time, waste streams generated would include treated groundwater and spent carbon vessels (estimated 4,000 lbs. /year).

Alternative 2 would also protect human health and the environment by mitigating exposures to contaminated soil and groundwater through deed restrictions and continued use of municipal water as a water supply source. Restoration of the impacted groundwater would also be achieved over time. Excavation would initially remove contaminant mass rapidly. Biosparging would provide ongoing active treatment. Excavation would generate about 700 tons of contaminated soil for transportation and disposal as hazardous waste. About 3,000 gallons of waste liquids are anticipated to be generated during excavation, and will require treatment and disposal. Spent carbon vessels would also need to be disposed and replaced during operation of the biosparge system, at about half the rate of the modified AS/SVE system.

Alternative 3 would protect human health and the environment by mitigating exposures to contaminated soil and groundwater through deed restrictions and continued use of municipal water as a supply source. Restoration of the impacted groundwater would also be achieved over time. Excavation would rapidly remove contaminant mass. Additional protection would be attained through AFVR events which would remove additional contaminant mass quickly. Waste generation would include 700 tons of grossly contaminated soil to be disposed as hazardous waste, 3,000 gallons of waste liquids to be generated during excavation, and any fluids removed during AFVR events. Although significant volumes of fluids would be removed by AFVR, events would be infrequent and of limited duration. Waste materials would be transferred directly to the mobile equipment for disposal eliminating regular handling and long-term accumulation of waste materials associated with the biosparging or AS/SVE.

## 10.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

ARAR's to be addressed by the selected remedy include compliance with South Carolina Groundwater Classifications and Standards. This means that all groundwaters of the state are considered Class GB or potential sources of drinking water. Therefore, the USEPA maximum contaminant levels, or MCLs are applicable.

The No Action Alternative would not achieve compliance with MCLs in a reasonable time frame because no action would be taken.

Alternative 1 would address this requirement through active treatment, but would require significant time to reach MCLs even within the radius of influence of the extraction system. Concentrations in the distal portions of the plume will eventually decrease, but contaminant mass would remain in the source area for some time. Additional ARARs to be addressed include permitting for construction of the DPE system, and for discharge of treated water, and potentially for treated vapors.

Alternative 2 would achieve groundwater quality standards more quickly by removing a significant amount of contaminant mass through excavation. This would be followed by in-situ active treatment. Passive remediation by indigenous microbes would be necessary to meet MCLs in the distal portions of the contaminant plume. Monitoring would be conducted to ensure that MNA is effective in meeting MCLs. Permitting for injection of nutrients and other amendments would be required, and a permit for discharge of treated vapor may be required.

Alternative 3 would address the groundwater quality standards through the initial removal event followed by additional fluid recovery events as needed to ensure that source area contamination does not serve as a long-term source of contaminants to the distal portions of the contaminant plume. Passive remediation by indigenous microbes would be necessary to meet MCLs in the distal portions of the contaminant plume. Monitoring would be conducted to ensure that MNA is effective in meeting MCLs. Well construction standards and regulations would apply to installation of recovery wells. Transportation and disposal requirements would have to comply with applicable regulations. Compliance with ARARs is roughly equivalent for alternatives 1, 2, & 3.

### 10.3 Long-term Effectiveness and Permanence

This criterion considers the magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities, as well as the adequacy and reliability of controls such as containment systems and institutional controls.

The No Action Alternative is ineffective in that no reduction in contaminant mass would be achieved, and no institutional controls would be implemented.

Alternatives 1, 2 & 3 would utilize institutional and engineering controls to reduce long-term risk from exposure to residual contamination.

Alternatives 2 & 3 would further reduce risks by initially removing a significant amount of contaminant mass through excavation. Alternatives 1 & 2 utilize active treatment systems that could breakdown and require repair or replacement of components during the life of the remedy.

Alternative 3 also utilizes active treatment, but through mobile systems that are contracted as needed. This ensures that remediation equipment will function as intended. Recovery wells may require replacement, but the likelihood of this can be reduced through proper construction materials and techniques.

Alternatives 1, 2 & 3 are rated "Moderate" for Long-term effectiveness and permanence.

### 10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

The No Action Alternative would not reduce contaminant toxicity, mobility or volume.

Alternative 1 would provide moderate reduction in contaminant toxicity, mobility and volume through active treatment. DPE mobilizes VOCs by stripping them from formation materials and capturing them. Captured vapors would be treated through an activated carbon filter, thus immobilizing contaminants for later disposal.

Alternatives 2 & 3 would provide greater reduction of contaminant volume through direct physical removal of toluene saturated soil and groundwater. Toxicity of the material itself would not be reduced, however it would be transported to an appropriately engineered and permitted disposal facility, thus reducing mobility and the potential for exposure to human or ecological receptors.

Alternative 2 would reduce the toxicity of residual toluene by providing nutrients that would facilitate biological breakdown. The associated SVE system would capture mobilized VOCs and treat them through an activated carbon filter, thus immobilizing them. Contaminant volume would be reduced over time.

Alternative 3 would treat extracted vapors catalytically, reducing toxicity. Captured liquids would be transported to a permitted treatment and disposal facility. This technology can reduce contaminant volume permanently by physical removal from the site.

MNA associated with alternatives 2 & 3 would further reduce contaminant toxicity, mobility and volume through metabolic breakdown. Alternatives 2 & 3 are rated "high" for this criterion.

### 10.5 Short-Term Effectiveness

Short-term effectiveness considers potential impacts to human health and the environment during implementation, and time required to reach remedial action objectives.

The No Action Alternative would not involve any construction or remedial action, and would not create any new risks. However, the potential for site worker exposure to contaminants would remain. The No Action alternative would not be expected to achieve RAOs.

Alternatives 1, 2 & 3 would present some risk to workers through potential incidental ingestion, dermal contact, and inhalation of VOCs during construction, remediation and monitoring activities. Noise from the treatment units could present some limited adverse impacts to onsite workers and nearby businesses. Risks could be minimized by following appropriate health and safety protocols, exercising sound engineering practices and utilizing proper PPE.

Alternatives 2 & 3 would present some risk to workers through potential incidental ingestion, dermal contact, and inhalation of VOCs during excavation and transportation of contaminated media. Alternative 2 would also involve additional risk from excavation shoring and construction of the biosparging system. These risks could be minimized by following appropriate health and safety protocols, exercising sound engineering practices and utilizing proper PPE.

Alternative 3 would present less short-term risk as operation of AFVR would only be conducted periodically as needed.

Achievement of RAOs would require 15- 20 years for Alternative 1, based on permeability of soils. Alternative 2 is estimated to require 5-10 years to reach RAOs. Alternative 3 is estimated to require 7-10 years to achieve RAOs.

The short-term effectiveness of the No Action Alternative is low. Short- term effectiveness is moderate for Alternatives 1, 2 & 3.

## 10.6 Implementability

The No Action Alternative is easily implementable.

Alternatives 1 would require a pre-design study to calculate system requirements. Malfunctioning components of the existing SVE system would need to be replaced. Installation of associated transfer pipelines and wells, and new water treatment equipment would be required. Long-term operation, maintenance and monitoring would be required. This alternative was rated "moderate" for implementability.

Alternative 2 would also require a pre-design study to design an excavation and shoring system, selection of appropriate nutrients for the biosparge system, replacement of malfunctioning components of the existing system, and installation of associated transfer pipelines and wells. Long-term operation, maintenance and monitoring would be required. This alternative was rated "low" for implementability.

Alternative 3 would require excavation and installation of an appropriately designed extraction well. Because the extraction well can be installed after the excavation is backfilled, no work would be conducted in the excavation. Therefore shoring would not be needed. Equipment used for AFVR events is mobile and readily available. Implementability for Alternative 3 is rated as "high."

## 10.7 Cost

The following table presents the probable range of costs for each alternative. Costs for each alternative were calculated using discount rates of 7% and 1.9% to evaluate the effects of inflation on costs throughout the projected duration of remedial action.

**Table 2: Probable Range of Costs for Each Alternative**

| Alternative | Non-Discounted Cost | 7% Discounted Rate | 1.9% Discount Rate |
|---|---|---|---|
| No Action | $0 | $0 | $0 |
| 1. Modified AS/SVE (Dual Phase Extraction) | $2,346,000 | $1,266,000 | $1,940,000 |
| 2. Excavation with Biosparging, MNA | $1,565,000 | $1,215,000 | $1,449,000 |
| 3. Excavation with AFVR, MNA | $848,000 | $694,000 | $797,000 |

## 10.8 Community Acceptance

This criterion considers whether the local community agrees with the Department's preferred alternative. Comments received on the Proposed Plan are important indicators of community acceptance.

The Department made its Proposed Plan available on April 26, 2018. A public comment period was held from April 26 to May 26, 2018. Notice of the plan was mailed to area property owners and local, state and federal officials. The Department received two phone calls in response to the notice. In both cases, the caller asked if the notice meant that there were environmental problems on their property. Department personnel explained that the contamination described in the notice is limited to a portion of the Wix Facility property, and does not extend off-site to other properties. Written comments were received by email from WSP USA, Inc. on behalf of MANN + HUMMEL on May 25, 2018. These were the only written comments received, and are included in the Responsiveness Summary (Appendix A).

## 11.0 Selected Remedy

The Department has selected Alternative 3, Excavation with Aggressive Fluid Vapor Recovery and Monitored Natural Attenuation as the remedy.

### 11.1 Description of Selected Remedy

This Alternative will require the non-impacted overburden soil to be removed from the upper 2 feet to expose the toluene saturated soil. The toluene saturated soil from 2 to 5 feet bgs will be excavated and properly disposed at an appropriately licensed off-site waste facility. The excavation will be backfilled with gravel to create a highly permeable groundwater flow zone. Stockpiled overburden native soil or borrow soil would be used to backfill the remainder of the excavation area (0 to 2 feet bgs). A 4-inch diameter extraction well will be installed within the gravel backfill for AFVR application. The AFVR technology would provide supplemental removal of toluene mass from extracted vapors and groundwater. Following the mass removal via excavation and AFVR, MNA would be implemented to monitor the physical, chemical, or biological reduction of toluene concentrations at the site. With the majority of the toluene mass removed, natural flux of limiting macro and micro-nutrients will have a more pronounced effect on attenuating the more diffuse areas of the plume. This combined technology reduces the mass, toxicity, mobility, and concentrations of VOCs. The alternative is technically feasible to implement, with resources available and can meet the RAOs at a moderate cost. An added benefit of this approach is that the existence of the 4" diameter extraction well will allow additional AFVR events to be conducted in the future if MNA is not effective in reaching remedial goals.

## 12.0 Statutory Determinations

The Department expects the Preferred Remedy to satisfy the following statutory requirements: 1) be protective of human health and the environment; 2) comply with applicable or relevant and appropriate requirements; 3) be cost-effective; 4) utilize permanent solutions to the maximum extent practicable; and 5) satisfy the preference for treatment as a principle element of the remedy.

## PART III - RESPONSIVENESS SUMMARY

The Proposed Plan was made available on the Department's website and announced to area property owners and other interested parties by mail on April 26, 2018. Post cards were mailed to 62 property owners identified by property records. Eighteen additional post cards were mailed to local, county, state, and federal officials. A public comment period was held from April 26 through May 26, 2018. During this time, the Department received two telephone inquiries regarding the notification post cards. The Department received written comments to the Proposed Plan by email on May 25, 2018 from WSP USA, Inc., the contractor that conducted the 2014-2015 Remedial Investigation and 2016 Feasibility Study. Comments are summarized below. No requests for an extension of the comment period were received and therefore the comment period ended on May 26, 2018.

### 1. Telephone Inquiry received Monday April 30, 2018 at 11:52 am

Inquiry/Question: Mr. Marcus Lewis stated that his mother bought land on West Main Street. She retired from Wix after 30 years. She received a post card and wanted to know more. She is planning to build a residence on her property. Will the proposed action affect that?

Response/Answer: A chemical solvent called toluene was released to the environment below ground. The contamination is limited to the Wix property. The only actions planned will take place on the Wix property. These activities will not affect the use of other properties. Several monitoring wells on the Wix property lie in between the area of contamination and Mr. Lewis's mother's property. Toluene levels in these wells are well below the drinking water standard.

### 2. Telephone Inquiry received Monday April 30, 2018 at 2:40 pm

Inquiry/Question: Mrs. Julia Kate M. Lynn contacted the SCDHEC project manager by phone. Mrs. Lynn owns land on that (Wix) road and wanted to know if the post card was anything that she needed to be concerned about.

Response/Answer: The post card was to announce the availability of the proposed plan to address contamination at the Wix facility. Contamination is limited to the Wix property. The remedial activities will also be limited to the Wix property.

### 3. Written comments received by email from WSP USA Inc.

Comments were received from Eric Johnson of WSP USA, Inc. (WSP). WSP is the remedial contractor retained by MANN + HUMMEL Filtration Technology US LLC (Formerly Wix Filtration Corp LLC) to conduct the Remedial Investigation and Feasibility Study. These comments are summarized below with the Department's responses. The full text of the email message is included in the Appendix.

Comment: The components of DHEC's Preferred Cleanup Summary identified in the Proposed Plan are consistent with Alternative 3, the recommended alternative in WSP's June 24, 2016, Focused Feasibility Study Report (FFS Report). WSP notes that the design of these components will be specified for DHEC's review in a Remedial Design Plan, and will be based on 1) appropriateness given the nature and extent of contamination, and 2) the remedial action objectives provided in the FFS Report.

Response: The Department concurs that the selected remedy is consistent with Alternative 3. The Department will draft an amendment to VCC 13-5996-RP for signature by MANN + HUMMEL which will incorporate the Remedial Design and Remedial Action phases of the project. No revision to the Proposed Plan is warranted by this comment.

Comment: The Proposed Plan does not identify any exposure risk from surface soils or surface water. Therefore, the engineering controls will be limited to those applicable while an exposure risk to impacted subsurface media is present, such as sediment and erosion controls during excavation activities and vapor controls during aggressive fluid/vapor recovery events.

Response: The Remedial Investigation did not identify any impact to or exposure risk from surface soils or surface water. The Feasibility Study addressed the impacts and risks that were identified in the RI and supplemental RI, specifically impacts to subsurface soil and groundwater and vapor inhalation risk. The Proposed Plan reflects those findings. No revision to the Proposed Plan is warranted by this comment.

Comment: The Summary of Site Risks in the Proposed Plan states that the total excess cancer risk to facility workers from vapor intrusion due to inhalation was $2.01 \times 10^{-6}$, which falls slightly above the lower limit of the U.S. Environmental Protection Agency (EPA) "risk management range" ($1 \times 10^{-6}$ to $1 \times 10^{-4}$). The risk assessment for vapor intrusion, provided to DHEC in WSP's September 2015 RI Report Addendum, was based on 13 sub-slab vapor (SSV) samples collected in 2014 and 2015. The Proposed Plan states "the Department has determined that sub-slab vapor sampling should be incorporated into the site monitoring program."

WSP's RI Report Addendum concluded that the "potential risks posed by the vapor intrusion exposure pathway at the Wix facility are within EPA's acceptable excess cancer risk range, and no adverse non-cancer health effects are likely associated with potential exposures to constituents of potential concern in indoor air by vapor intrusion". DHEC's October 2015 review letter for the RI Report Addendum did not provide any comments on the need to perform vapor monitoring during future activities. Based on the lack of DHEC comments and the site's risk level falling slightly above the lower limit of the EPA risk management range, the inclusion of this monitoring activity in the Proposed Plan is both unexpected and unnecessary.

WSP and MANN + HUMMEL have reservations about the utility of additional vapor sampling. If, however, after reviewing the above comments, DHEC still requires additional sampling, MANN + HUMMEL is willing to develop and implement a limited SSV monitoring program pursuant to DHEC's request in the Proposed Plan. The monitoring program would be sufficient to determine whether residual volatile organic compounds would pose a potential health concern to facility workers. The details of the SSV monitoring program would be submitted to DHEC for review prior to implementation.

Response: After carefully reviewing the above comments, the Department maintains that sub-slab vapor monitoring is an appropriate response to the findings of the RI and RI Addendum. As indicated in the comment, the reported total risk from vapor inhalation was calculated to be slightly greater than the lower limit of the risk management range of $1 \times 10^{-6}$ to $1 \times 10^{-4}$. Risks above the $1 \times 10^{-4}$ generally warrant some form of corrective action to eliminate exposures or otherwise mitigate risk, while those below $1 \times 10^{-6}$ are generally eliminated from further consideration. The Department considers vapor monitoring to be an appropriate response to risks falling within the risk management range between those two thresholds.

The remainder of the Responsiveness Summary is included in Appendix A, and consists of the following:

- The Department's Proposed Plan;
- Email correspondence from Eric Johnson, WSP USA, Inc. dated 5/25/2018

# Figures

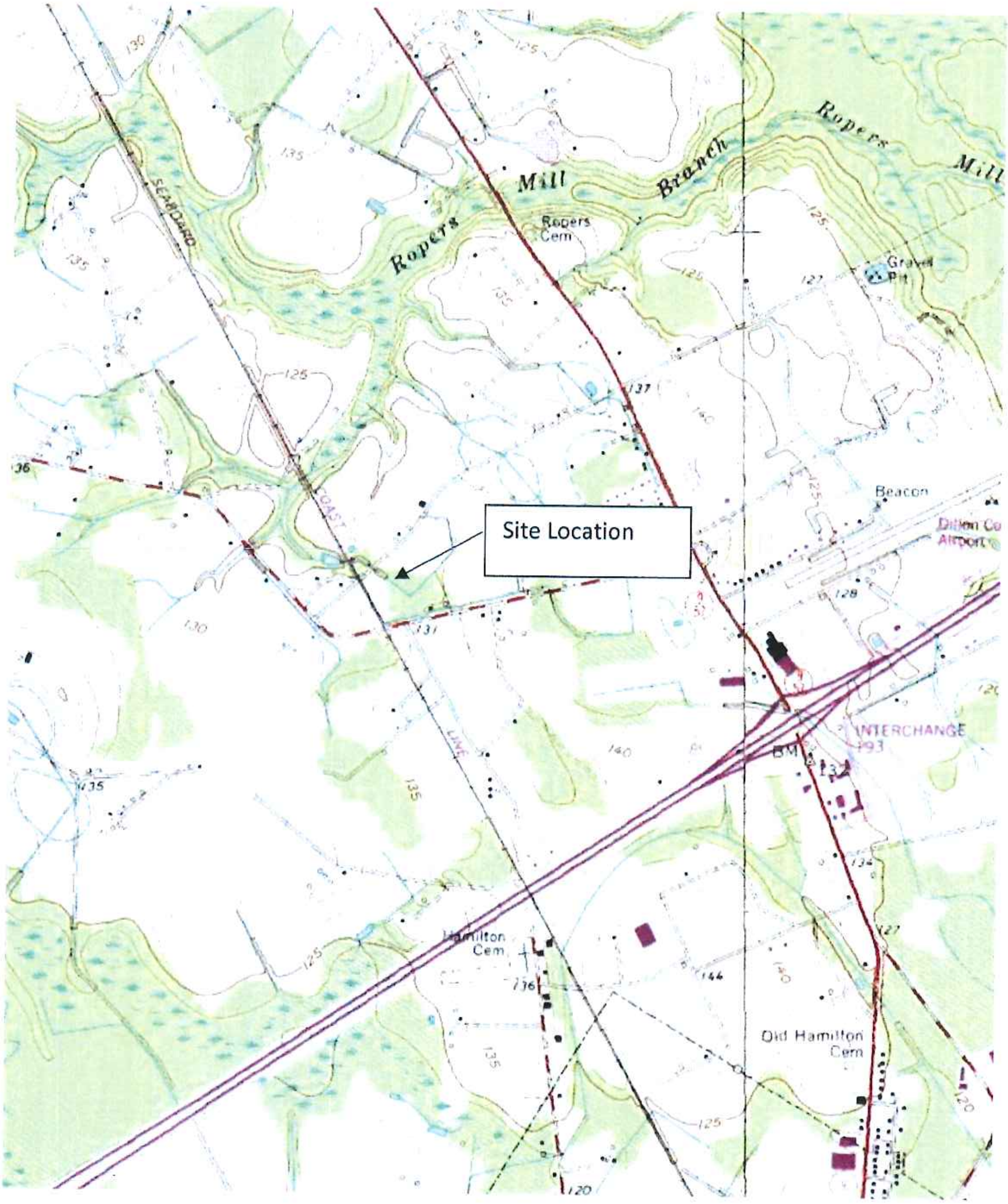
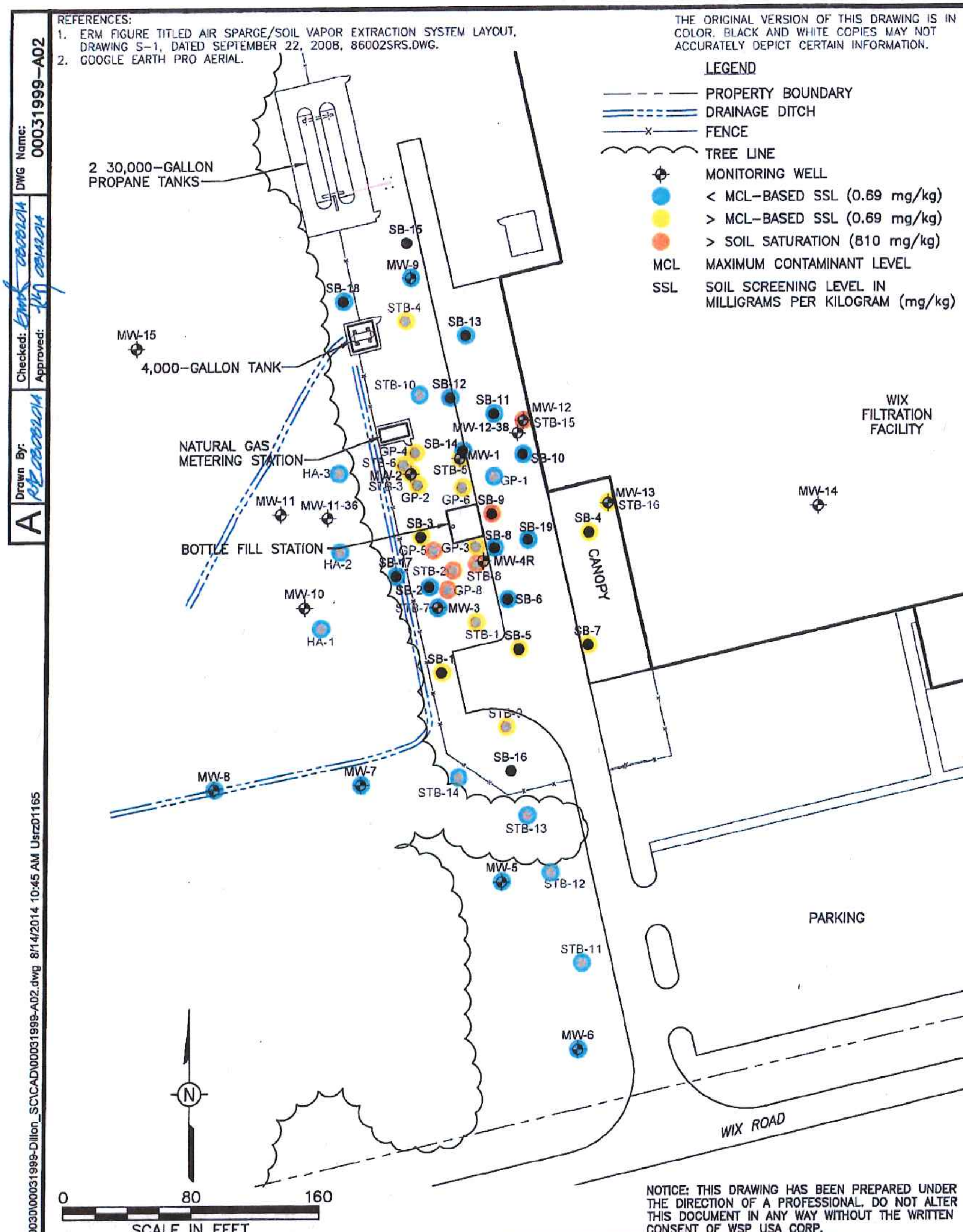



Figure 1. Site Location
Source: USGS 7.5 Minute Quadrangle Dillon West, South Carolina
Photorevised 1983 Scale 1:24,000




WSP

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Reston, Virginia 20191
(703) 709-6500
www.wspgroup.com/usa

FIGURE 2

SOIL TOLUENE RESULTS

WIX FILTRATION PLANT
DILLON, SOUTH CAROLINA

PREPARED FOR
WIX FILTRATION CORP LLC
DILLON, SOUTH CAROLINA

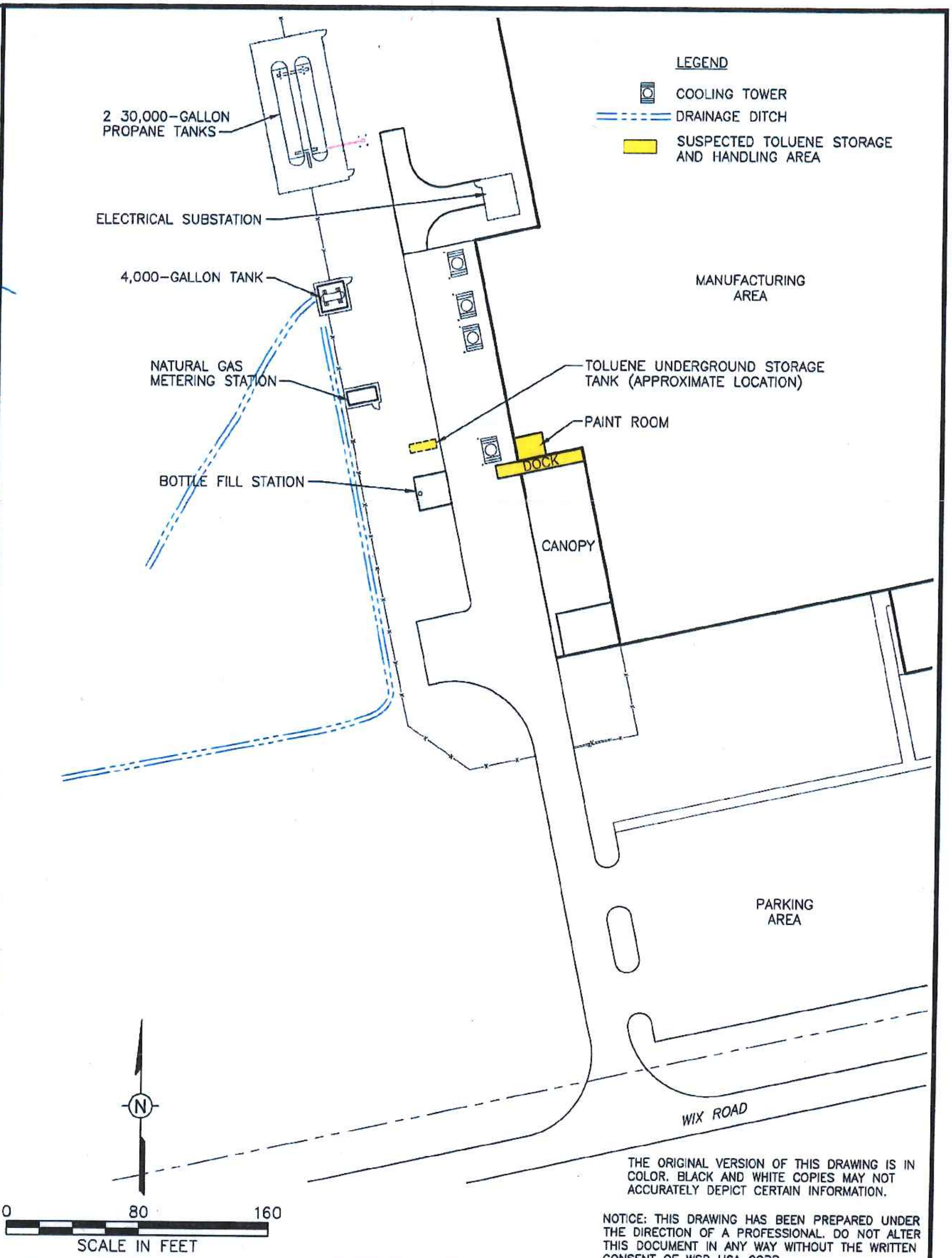


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FIGURE 3

AREAS OF PRESUMED HISTORICAL TOLUENE STORAGE AND USE

WIX FILTRATION FACILITY
DILLON, SOUTH CAROLINA

PREPARED FOR
WIX FILTRATION CORP LLC
DILLON, SOUTH CAROLINA

A | Drawn By: RZ 08/08/2014 | Checked: 08/08/2014 | Approved: 08/14/2014 | DWG Name: 00031999-A05

R:\CAD\Acad\CADD\00030\00031999-Dillon_SC\CAD\00031999-A05.dwg 8/14/2014 11:18 AM Usrz01165

A Drawn By: RE 08/08/2014 Checked: 08/08/2014 Approved: 08/14/2014 DWG Name: 00031999-A02

REFERENCES:
1. ERM FIGURE TITLED AIR SPARGE/SOIL VAPOR EXTRACTION SYSTEM LAYOUT, DRAWING S-1, DATED SEPTEMBER 22, 2008, 86002SRS.DWG.
2. GOOGLE EARTH PRO AERIAL.

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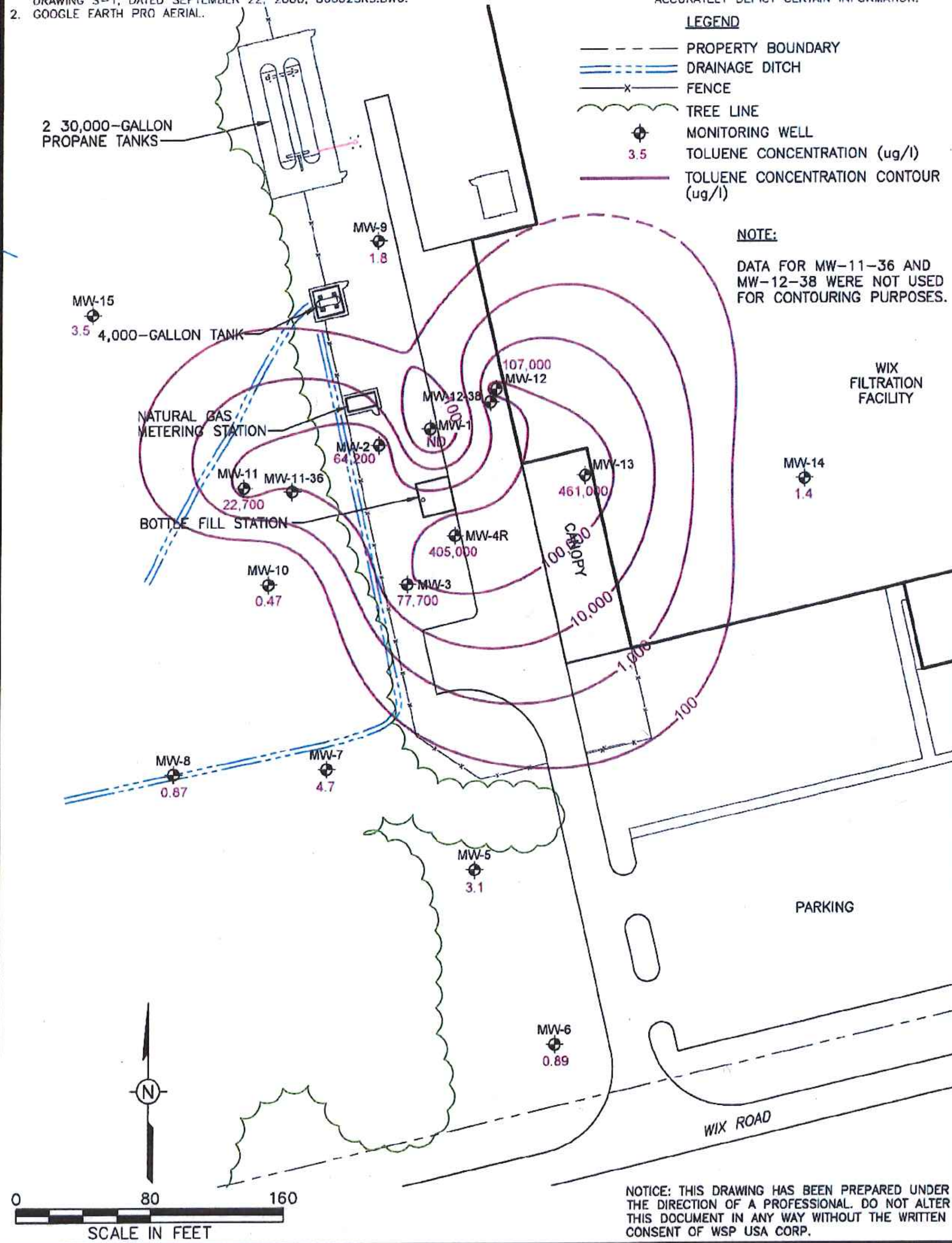
LEGEND

- PROPERTY BOUNDARY
- DRAINAGE DITCH
- FENCE
- TREE LINE
- MONITORING WELL
- 3.5 TOLUENE CONCENTRATION (ug/l)
- TOLUENE CONCENTRATION CONTOUR (ug/l)

NOTE:

DATA FOR MW-11-36 AND MW-12-38 WERE NOT USED FOR CONTOURING PURPOSES.




NOTICE: THIS DRAWING HAS BEEN PREPARED UNDER THE DIRECTION OF A PROFESSIONAL. DO NOT ALTER THIS DOCUMENT IN ANY WAY WITHOUT THE WRITTEN CONSENT OF WSP USA CORP.

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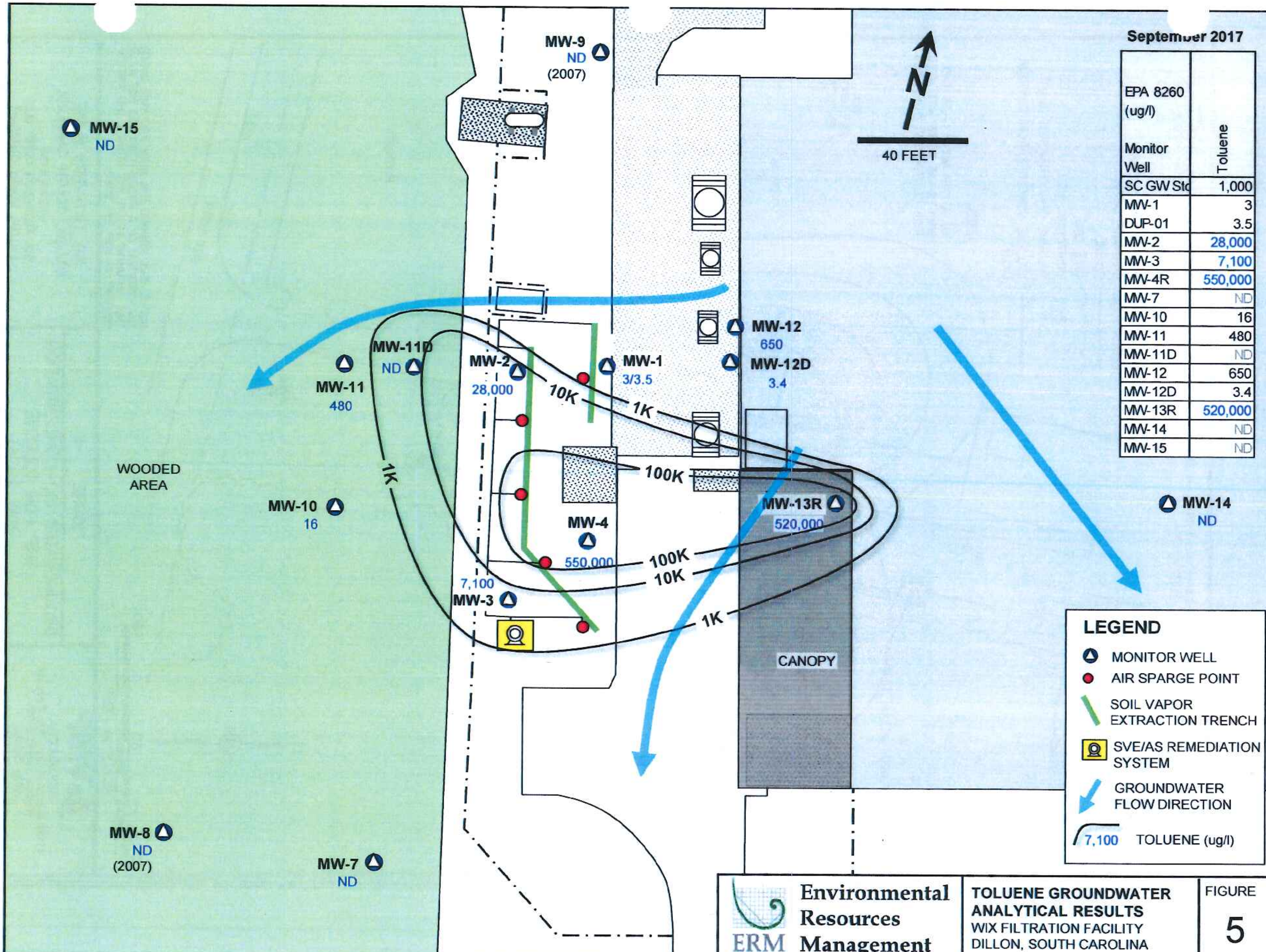
FIGURE 4

GROUNDWATER ISO-CONCENTRATION MAP FOR TOLUENE (MAY 2014)

WIX FILTRATION PLANT
DILLON, SOUTH CAROLINA
PREPARED FOR
WIX FILTRATION CORP LLC
DILLON, SOUTH CAROLINA



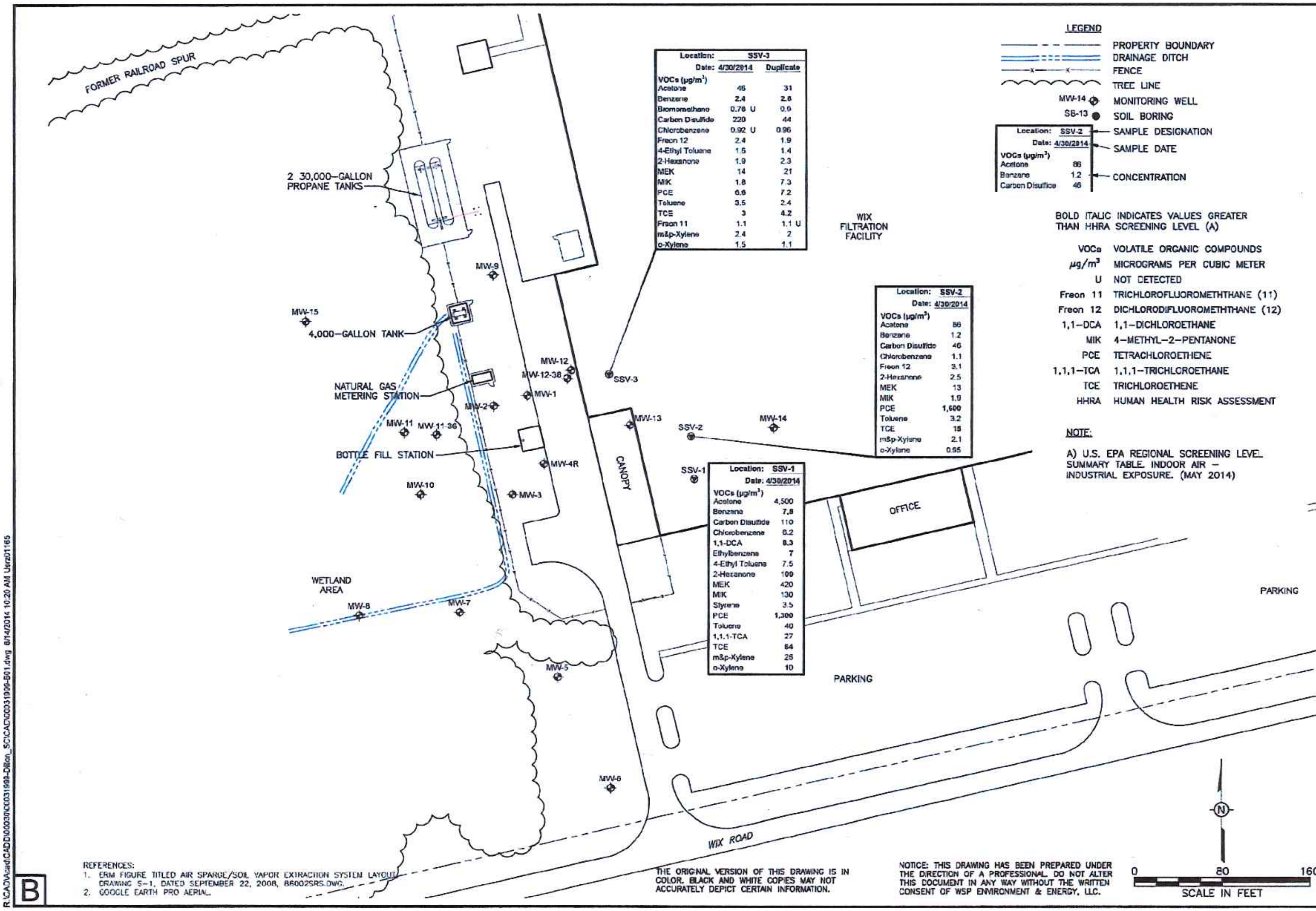

September 2017

| EPA 8260 (ug/l) Monitor Well | Toluene |
|---|---|
| SC GW Std | 1,000 |
| MW-1 | 3 |
| DUP-01 | 3.5 |
| MW-2 | 28,000 |
| MW-3 | 7,100 |
| MW-4R | 550,000 |
| MW-7 | ND |
| MW-10 | 16 |
| MW-11 | 480 |
| MW-11D | ND |
| MW-12 | 650 |
| MW-12D | 3.4 |
| MW-13R | 520,000 |
| MW-14 | ND |
| MW-15 | ND |

ERM Environmental Resources Management

**TOLUENE GROUNDWATER ANALYTICAL RESULTS**
WIX FILTRATION FACILITY
DILLON, SOUTH CAROLINA

FIGURE 5




| Location: | SSV-3 | |
|---|---|---|
| Date: | 4/30/2014 | Duplicate |
| VOCs (μg/m³) | | |
| Acetone | 46 | 31 |
| Benzene | 2.4 | 2.6 |
| Bromomethane | 0.78 U | 0.9 |
| Carbon Disulfide | 220 | 44 |
| Chlorobenzene | 0.92 U | 0.96 |
| Freon 12 | 2.4 | 1.9 |
| 4-Ethyl Toluene | 1.5 | 1.4 |
| 2-Hexanone | 1.9 | 2.3 |
| MEK | 14 | 21 |
| MIK | 1.8 | 7.3 |
| PCE | 6.6 | 7.2 |
| Toluene | 3.5 | 2.4 |
| TCE | 3 | 4.2 |
| Freon 11 | 1.1 | 1.1 U |
| m&p-Xylene | 2.4 | 2 |
| o-Xylene | 1.5 | 1.1 |

| Location: | SSV-2 |
|---|---|
| Date: | 4/30/2014 |
| VOCs (μg/m³) | |
| Acetone | 86 |
| Benzene | 1.2 |
| Carbon Disulfide | 46 |
| Chlorobenzene | 1.1 |
| Freon 12 | 3.1 |
| 2-Hexanone | 2.5 |
| MEK | 13 |
| MIK | 1.9 |
| PCE | 1,600 |
| Toluene | 3.2 |
| TCE | 15 |
| m&p-Xylene | 2.1 |
| o-Xylene | 0.95 |

| Location: | SSV-1 |
|---|---|
| Date: | 4/30/2014 |
| VOCs (μg/m³) | |
| Acetone | 4,500 |
| Benzene | 7.8 |
| Carbon Disulfide | 110 |
| Chlorobenzene | 6.2 |
| 1,1-DCA | 8.3 |
| Ethylbenzene | 7 |
| 4-Ethyl Toluene | 7.5 |
| 2-Hexanone | 109 |
| MEK | 420 |
| MIK | 130 |
| Styrene | 3.5 |
| PCE | 1,300 |
| Toluene | 40 |
| 1,1,1-TCA | 27 |
| TCE | 84 |
| m&p-Xylene | 25 |
| o-Xylene | 10 |

| Location: | SSV-2 |
|---|---|
| Date: | 4/30/2014 |
| VOCs (μg/m³) | |
| Acetone | 86 |
| Benzene | 1.2 |
| Carbon Disulfice | 46 |

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FIGURE 6

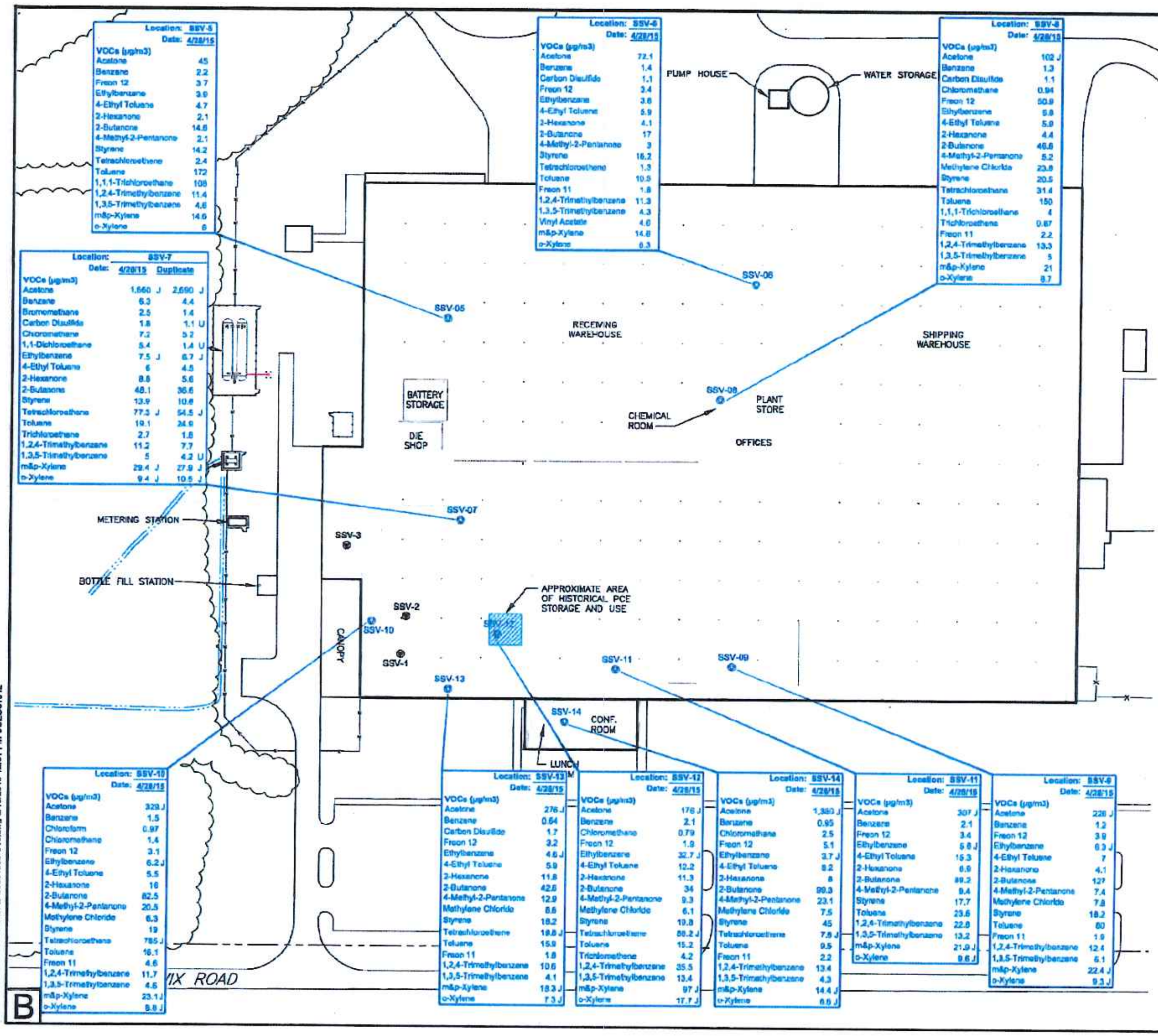
REMEDIAL INVESTIGATION
SUB–SLAB VAPOR SAMPLING RESULTS
(MAY 2014)

WIX FILTRATION FACILITY
DILLON, SOUTH CAROLINA

PREPARED FOR
WIX FILTRATION CORP LLC
DILLON, SOUTH CAROLINA

Drawn By: RAZ 08072014
Checked: EMK 08072014
Approved: RJ 08142014
DWG Name: C0031999–B01

R:\ACAD\CADD\00031999\CAD\00031999-046.dwg 8/13/2015 12:31 PM USEC01012




| Location: SSV-5 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 45 |
| Benzene | 2.2 |
| Freon 12 | 3.7 |
| Ethylbenzene | 3.9 |
| 4-Ethyl Toluene | 4.7 |
| 2-Hexanone | 2.1 |
| 2-Butanone | 14.8 |
| 4-Methyl-2-Pentanone | 2.1 |
| Styrene | 14.2 |
| Tetrachloroethene | 2.4 |
| Toluene | 172 |
| 1,1,1-Trichloroethane | 108 |
| 1,2,4-Trimethylbenzene | 11.4 |
| 1,3,5-Trimethylbenzene | 4.6 |
| m&p-Xylene | 14.6 |
| o-Xylene | 6 |

| Location: SSV-6 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 72.1 |
| Benzene | 1.4 |
| Carbon Disulfide | 1.1 |
| Freon 12 | 3.4 |
| Ethylbenzene | 3.8 |
| 4-Ethyl Toluene | 5.9 |
| 2-Hexanone | 4.1 |
| 2-Butanone | 17 |
| 4-Methyl-2-Pentanone | 3 |
| Styrene | 16.2 |
| Tetrachloroethene | 1.3 |
| Toluene | 10.5 |
| Freon 11 | 1.8 |
| 1,2,4-Trimethylbenzene | 11.3 |
| 1,3,5-Trimethylbenzene | 4.3 |
| Vinyl Acetate | 4.6 |
| m&p-Xylene | 14.8 |
| o-Xylene | 6.3 |

| Location: SSV-8 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 102 J |
| Benzene | 1.3 |
| Carbon Disulfide | 1.1 |
| Chloromethane | 0.94 |
| Freon 12 | 50.9 |
| Ethylbenzene | 5.8 |
| 4-Ethyl Toluene | 5.9 |
| 2-Hexanone | 4.4 |
| 2-Butanone | 46.6 |
| 4-Methyl-2-Pentanone | 5.2 |
| Methylene Chloride | 23.8 |
| Styrene | 20.5 |
| Tetrachloroethene | 31.4 |
| Toluene | 150 |
| 1,1,1-Trichloroethane | 4 |
| Trichloroethene | 0.87 |
| Freon 11 | 2.2 |
| 1,2,4-Trimethylbenzene | 13.3 |
| 1,3,5-Trimethylbenzene | 5 |
| m&p-Xylene | 21 |
| o-Xylene | 8.7 |

| Location: | SSV-7 | |
|---|---|---|
| Date: | 4/28/15 | Duplicate |
| VOCs (µg/m3) | | |
| Acetone | 1,660 J | 2,690 J |
| Benzene | 6.3 | 4.4 |
| Bromomethane | 2.5 | 1.4 |
| Carbon Disulfide | 1.8 | 1.1 U |
| Chloromethane | 7.2 | 5.2 |
| 1,1-Dichloroethane | 5.4 | 1.4 U |
| Ethylbenzene | 7.5 J | 6.7 J |
| 4-Ethyl Toluene | 6 | 4.5 |
| 2-Hexanone | 8.8 | 5.6 |
| 2-Butanone | 48.1 | 36.6 |
| Styrene | 13.9 | 10.8 |
| Tetrachloroethene | 77.3 J | 54.5 J |
| Toluene | 19.1 | 24.9 |
| Trichloroethene | 2.7 | 1.8 |
| 1,2,4-Trimethylbenzene | 11.2 | 7.7 |
| 1,3,5-Trimethylbenzene | 5 | 4.2 U |
| m&p-Xylene | 29.4 J | 27.9 J |
| o-Xylene | 9.4 J | 10.5 J |

| Location: SSV-10 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 329 J |
| Benzene | 1.5 |
| Chloroform | 0.97 |
| Chloromethane | 1.4 |
| Freon 12 | 3.1 |
| Ethylbenzene | 6.2 J |
| 4-Ethyl Toluene | 5.5 |
| 2-Hexanone | 16 |
| 2-Butanone | 82.5 |
| 4-Methyl-2-Pentanone | 20.5 |
| Methylene Chloride | 6.3 |
| Styrene | 19 |
| Tetrachloroethene | 785 J |
| Toluene | 16.1 |
| Freon 11 | 4.6 |
| 1,2,4-Trimethylbenzene | 11.7 |
| 1,3,5-Trimethylbenzene | 4.6 |
| m&p-Xylene | 23.1 J |
| o-Xylene | 8.8 J |

| Location: SSV-13 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 276 J |
| Benzene | 0.64 |
| Carbon Disulfide | 1.7 |
| Freon 12 | 3.2 |
| Ethylbenzene | 4.6 J |
| 4-Ethyl Toluene | 5.9 |
| 2-Hexanone | 11.8 |
| 2-Butanone | 42.6 |
| 4-Methyl-2-Pentanone | 12.9 |
| Methylene Chloride | 8.6 |
| Styrene | 18.2 |
| Tetrachloroethene | 19.8 J |
| Toluene | 15.9 |
| Freon 11 | 1.8 |
| 1,2,4-Trimethylbenzene | 10.6 |
| 1,3,5-Trimethylbenzene | 4.1 |
| m&p-Xylene | 18.3 J |
| o-Xylene | 7.3 J |

| Location: SSV-12 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 176 J |
| Benzene | 2.1 |
| Chloromethane | 0.79 |
| Freon 12 | 1.9 |
| Ethylbenzene | 32.7 J |
| 4-Ethyl Toluene | 12.2 |
| 2-Hexanone | 11.3 |
| 2-Butanone | 34 |
| 4-Methyl-2-Pentanone | 9.3 |
| Methylene Chloride | 6.1 |
| Styrene | 19.8 |
| Tetrachloroethene | 88.2 J |
| Toluene | 15.2 |
| Trichloroethene | 4.2 |
| 1,2,4-Trimethylbenzene | 35.5 |
| 1,3,5-Trimethylbenzene | 13.4 |
| m&p-Xylene | 97 J |
| o-Xylene | 17.7 J |

| Location: SSV-14 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 1,380 J |
| Benzene | 0.95 |
| Chloromethane | 2.5 |
| Freon 12 | 5.1 |
| Ethylbenzene | 3.7 J |
| 4-Ethyl Toluene | 8.2 |
| 2-Hexanone | 8 |
| 2-Butanone | 99.3 |
| 4-Methyl-2-Pentanone | 23.1 |
| Methylene Chloride | 7.5 |
| Styrene | 45 |
| Tetrachloroethene | 7.8 J |
| Toluene | 9.5 |
| Freon 11 | 2.2 |
| 1,2,4-Trimethylbenzene | 13.4 |
| 1,3,5-Trimethylbenzene | 4.3 |
| m&p-Xylene | 14.4 J |
| o-Xylene | 6.6 J |

| Location: SSV-11 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 307 J |
| Benzene | 2.1 |
| Freon 12 | 3.4 |
| Ethylbenzene | 5.8 J |
| 4-Ethyl Toluene | 15.3 |
| 2-Hexanone | 6.9 |
| 2-Butanone | 89.2 |
| 4-Methyl-2-Pentanone | 9.4 |
| Styrene | 17.7 |
| Toluene | 23.6 |
| 1,2,4-Trimethylbenzene | 22.8 |
| 1,3,5-Trimethylbenzene | 13.2 |
| m&p-Xylene | 21.9 J |
| o-Xylene | 9.6 J |

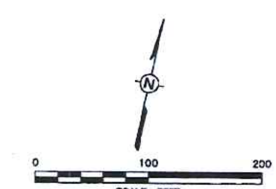
| Location: SSV-9 | Date: 4/28/15 |
|---|---|
| VOCs (µg/m3) | |
| Acetone | 228 J |
| Benzene | 1.2 |
| Freon 12 | 3.9 |
| Ethylbenzene | 6.3 J |
| 4-Ethyl Toluene | 7 |
| 2-Hexanone | 4.1 |
| 2-Butanone | 127 |
| 4-Methyl-2-Pentanone | 7.4 |
| Methylene Chloride | 7.8 |
| Styrene | 18.2 |
| Toluene | 80 |
| Freon 11 | 1.9 |
| 1,2,4-Trimethylbenzene | 12.4 |
| 1,3,5-Trimethylbenzene | 6.1 |
| m&p-Xylene | 22.4 J |
| o-Xylene | 9.3 J |

**LEGEND**

- PROPERTY BOUNDARY
- DRAINAGE DITCH
- FENCE
- TREE LINE
- SSV-2 — SUB-SLAB VAPOR SAMPLE (APRIL 2014)
- SSV-06 — SUB-SLAB VAPOR SAMPLE (APRIL 2015)
- VOCs — VOLATILE ORGANIC COMPOUNDS
- ug/m3 — MICROGRAMS PER CUBIC METER
- U — NOT DETECTED
- J — ESTIMATED CONCENTRATION

**REFERENCES:**

1. ERM FIGURE TITLED AIR SPARGE/SOIL VAPOR EXTRACTION SYSTEM LAYOUT, DRAWING S-1, DATED SEPTEMBER 22, 2008, B6002SRS.DWG.
2. GOOGLE EARTH PRO AERIAL.

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WSP USA Corp.
11190 Sunrise Valley Drive, Suite 300
Reston, Virginia 20191
(703) 709-6500
www.wspgroup.com/usa

FIGURE 7

SUB-SLAB VAPOR SAMPLE RESULTS
APRIL 2015

WIX FILTRATION FACILITY
DILLON, SOUTH CAROLINA

PREPARED FOR
WIX FILTRATION CORP LLC
DILLON, SOUTH CAROLINA

| | |
|---|---|
| Drawn By: | EGC |
| Checked: | |
| Approved: | REJ 8/13/2015 |
| DWG Name: | 00031999-046 |

# Appendix A

S.C. Department of Health and Environmental Control

# Proposed Plan for Site Remediation
## Wix Dillon Site

*1422 Wix Road, Dillon, South Carolina*

April 2018

## ANNOUNCEMENT OF PROPOSED PLAN

The South Carolina Department of Health and Environmental Control (DHEC or the Department) has evaluated cleanup alternatives to address contamination at the Wix Dillon Site. This Proposed Plan identifies DHEC's Preferred Alternative for cleaning up contaminated soil and groundwater and provides the reasoning for this preference. In addition, the Proposed Plan includes summaries of other cleanup alternatives evaluated. These alternatives were identified based on information gathered during environmental investigations conducted by Wix pursuant to Voluntary Cleanup Contract 13-5996-RP, dated September 5, 2013, between DHEC and Wix Filtration Corp LLC.

The Department is presenting this Proposed Plan to inform the public of our activities, to gain public input, and to fulfill the requirements of CERCLA Section 117(a) and National Contingency Plan Section 300.430(f) (2). This Proposed Plan summarizes information that can be found in greater detail in the Revised Focused Feasibility Study (FFS) report dated June 24, 2016 and other documents contained in the Administrative Record file. The Department encourages the public to review these documents to gain a comprehensive understanding of the Site and activities that have been conducted.

The Department will select a final remedy after reviewing and considering comments submitted during the 30-day public comment period. The Department may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

### DHEC's Preferred Cleanup Summary

DHEC's preferred remedy is identified in the FFS as Alternative 3. Alternative 3 consists of:

- Excavation of contaminated soils
- Aggressive Fluid/Vapor Recovery (AFVR)
- Monitored Natural Attenuation (MNA)
- Institutional and Engineering Controls

The remaining pages provide additional details of the Proposed Plan.

- **PUBLIC COMMENT PERIOD:**
  **April 26 through May 26, 2018**

DHEC will accept written comments on the Proposed Plan during the public comment period. Submit your written comments to:

Tim Hornosky, Project Manager
DHEC-BLWM
2600 Bull St.
Columbia, SC 29201
Email: hornostr@dhec.sc.gov

- **PUBLIC MEETING:**

If comments are received or there is interest from members of the community, DHEC may hold a public meeting to explain the Proposed Plan, and all of the alternatives presented in the Feasibility Study. After the Proposed Plan presentation, DHEC will respond to your questions. Oral and written comments will also be accepted at this time.

- **FOR MORE INFORMATION:**

**Call:** Tim Hornosky, DHEC Project Manager, 803-898-0733

**See:** DHEC's website at:
**http://www.scdhec.gov/PublicNotices/**

**View:** The Administrative Record at the following locations:

Dillon County Public Library
600 E Main St,
Dillon, SC
(843) 744-0330

DHEC Freedom of Information Office
2600 Bull Street, Columbia, SC
(803) 898-3817
Hours: Monday - Friday: 8:30a.m. - 5:00p.m.

## SITE HISTORY

The Wix Site is located at 1422 Wix Road in Dillon, SC. The property consists of approximately 80 acres and contains a 376,000 square-foot manufacturing building and several smaller structures. The site is bounded by to the north by farmland and the Franco Manufacturing facility, to the west by the CSX transportation railroad line and a residence/small business, to the south by Wix Road and farmland and to the east by cultivated and wooded farmland (Figure 1).

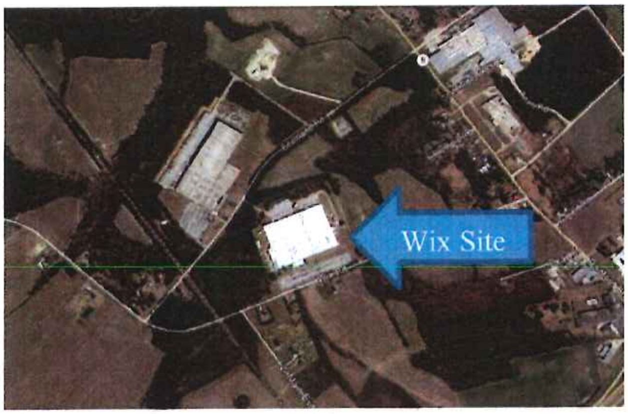


Figure 1

Wix formerly stored the solvent **toluene** in an underground storage tank (UST) located outside the west wall of the manufacturing building. Toluene was dispensed via an underground piping network to various locations in the manufacturing building where it was used to formulate paints. After this tank was closed in the mid-1980s, toluene was stored in drums inside the paint room located in the southwestern portion of the building.

In October 2005, workers detected a paint-like odor in shallow soil excavated during repairs to an underground water line west of the manufacturing building. Soil and groundwater samples were collected and analyzed for volatile organic compounds (VOCs), a class of chemicals including toluene. Upon receipt of the sampling data, Wix notified DHEC that contamination had been detected in December 2005.

Beginning in spring 2006, Wix conducted various activities including:

- 2006 Environmental Site Assessment,
- 2008 Remedial Options Assessment,
- 2008 Remedial Action Plan to select and implement a remedial technology to mitigate environmental impacts,
- 2010-2011 Supplemental assessment activities

An air sparge/soil vapor extraction (AS/SVE) system began operation in December 2009. Based on monitoring data collected during operation of the AS/SVE system, this approach is not effective in removing contamination. In 2013, DHEC invited Wix to enter into a Voluntary Cleanup Contract (VCC) to conduct further assessment and remediation. The VCC required Wix to complete a Remedial Investigation (RI) to determine the nature and extent of contamination, and a Focused Feasibility Study (FFS) to evaluate cleanup options. A Human Health Risk Assessment (HHRA) was completed as part of the RI

An RI Report was submitted on August 21, 2014 and approved by DHEC on September 23, 2014. An RI Addendum was submitted on August 20, 2015. DHEC approved the RI Addendum on October 15, 2015. An FFS was submitted on December 21, 2015. DHEC provided comments to the FFS on April 4, 2016. A Revised FFS was submitted on June 24, 2016 and approved on June 29, 2016.

## NATURE AND EXTENT OF CONTAMINATION

The RI confirmed that very high concentrations of toluene remained in soil and groundwater beneath the Site. Additional groundwater monitoring wells were installed to determine the horizontal and vertical extent of the contamination. Trace levels of chlorinated solvent are also present in soil and groundwater at the facility. The RI Addendum was completed in order to evaluate the potential risk to site workers from exposure to chlorinated solvents in indoor air. An engineering evaluation of the existing AS/SVE system was also included in the RI Addendum.

- **Groundwater -** Groundwater contamination has been identified in the shallow water table aquifer. In the vicinity of the former toluene UST, shallow groundwater is contaminated above the 1,000 micrograms per liter (ug/L) maximum contaminant level (MCL) as established by the Safe Drinking Water Act. The horizontal extent of groundwater exceeding the MCL for toluene is estimated to be 42,800 square feet. Benzene was detected above its MCL of 5 ug/L in a small area of the toluene impacted portion of the shallow groundwater. Cis-1,2-dichloroethylene (cis-1,2-DCE) was detected above its MCL of 70 ug/L in one well located inside the manufacturing building.

- **Subsurface Soils** – Subsurface soils are impacted in an area of approximately 22,000 square feet around the location of the former toluene UST. In this area, toluene concentrations exceed the soil screening level for protection of groundwater. This is the level at which soil contamination would be expected to cause groundwater contamination above the MCL.

- **Surface Soil -** Surface soils are not a concern as the release occurred in the subsurface.

- **Indoor Air**–The 2014 RI included collection and analysis of three (3) sub-slab vapor samples. Toluene was not detected above the US Environmental Protection Agency's (EPA's) industrial Regional Screening Level (RSL) for air in any of the sub-slab vapor samples. However, benzene, ethylbenzene, 4-ethyl toluene, 2-hexanone, tetrachloroethylene (PCE), and trichloroethylene (TCE) were detected at concentrations greater than the industrial air RSLs. Ten (10) additional sub-slab vapor samples were collected as part of the RI Addendum in 2015. Analytical results were evaluated in the HHRA. The results of the HHRA are discussed in the Summary of Site Risks section.

- **Surface Water**–Two surface water samples were collected from a drainage ditch west of the area of contamination in May 2006. No VOCs were detected in either of these samples. No surface water investigation was conducted during the 2014 RI or 2015 RI Addendum. The closest natural surface water feature is a small unnamed stream located north of Scotland Road approximately 200 feet from the northwest corner of the Wix property.

- **Sediment**–Two sediment samples were collected from a storm drainage ditch west of the area of contamination in May 2006. Only one compound, p-isopropyltoluene was detected in one sediment sample at trace levels. P-isopropyltoluene is a naturally occurring aromatic compound, and is present in herbs such as thyme and cumin. No regulatory criteria have been established for this compound.

## SCOPE AND ROLE OF THE ACTION

The proposed action in this plan is intended to be the final cleanup action for the Site. The proposed actions include removal of soils saturated with toluene. The proposed remedy would prevent exposure to contaminated subsurface soils, groundwater and air; preventing the further migration of contaminants from soil to groundwater; and restoring groundwater quality through the use of active treatment followed by monitored natural attenuation. The proposed remedy will permanently reduce the toxicity, mobility, and volume of contamination at the Site.

## SUMMARY OF SITE RISKS

As part of the RI, Wix conducted a baseline human health risk assessment (HHRA) to determine the potential current and future risks to human health. Soil and groundwater contamination are limited to the western portion of the subject property. The current use of this part of the property is industrial. Part of the northeastern portion of the property is leased for agricultural use. With respect to potential receptors, Onsite Facility Worker (Adult), and Onsite Construction and Utility Worker (Adult) exposures were considered.

The 2014 RI assessed the potential effects of exposure to affected soil, groundwater, and sub-slab vapor at the Site. Unacceptable risk was noted for utility/construction workers potentially exposed to toluene and cis-1,2-dichloroethylene (cis-1,2-DCE) in shallow groundwater and to benzene, toluene, TCE, and xylenes in trench air while conducting sub-grade work in the impacted area. In addition, the HHRA identified unacceptable risk for facility workers potentially exposed to the concentrations of PCE and TCE in indoor air as a result of vapor intrusion into the manufacturing building. The evaluation of the vapor intrusion exposure pathway in the 2014 HHRA was based on three sub-slab vapor samples.

Given the limited set of sub-slab vapor samples, further assessment of the potential for worker exposure by vapor intrusion was warranted for the site. As part of the supplemental RI activities, ten additional sub-slab vapor samples were collected to further characterize the extent of VOCs in sub-slab vapor underneath the building and to better define the potential risk from vapor intrusion. Results from both the 2014 and 2015 samples were evaluated using updated vapor intrusion guidance released by USEPA in 2015. The maximum detected concentrations were used to calculate the potential for risks to facility workers from vapor intrusion. Based on this evaluation, the RI Addendum Report concluded that total excess cancer risk due to inhalation was $2.01 \times 10^{-6}$. Total excess cancer risks less than $1 \times 10^{-6}$ are considered to be below the "point of departure" and generally do not require corrective action. Risks greater than $1 \times 10^{-4}$ are generally considered unacceptable and require corrective action. Risks which fall in between these levels are considered to be within the USEPA's "risk management range." Within this range, risk assessors and project managers utilize professional judgement to ascertain whether these risk pathways are likely to result in actual exposures, and to determine whether response actions could effectively reduce potential risks to acceptable levels.

The calculated excess cancer risk to facility workers from indoor air is based on the maximum concentration detected from 13 samples. Further, the chemical responsible for the majority of the risk (PCE) is not the major chemical of concern at the site. No source or release of PCE has been identified. Wix has indicated that PCE was used historically and is no longer used at the facility. Considering these factors, the Department has determined that sub-slab vapor sampling should be incorporated into the site monitoring program. It is not likely that the preferred remedy will reduce concentrations of PCE in soil beneath the building slab. However the results of future monitoring will be used to determine if additional response actions are necessary to address PCE.

DHEC's current decision is that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to reduce VOC concentrations in soil and groundwater to protect public health and the environment, and ultimately reduce contaminants in groundwater to below the MCLs.

## CLEANUP GOALS

Remedial action objectives (RAOs) are developed in order to set goals for protecting human health and the environment. The goals should be as specific as possible but should not unduly limit the range of alternatives that can be developed. Accordingly, the following RAOs were developed for the Site:

1. Reduce toluene concentrations in source area soils to minimize potential migration to shallow groundwater.
2. Mitigate human health risks from the potential exposure of affected media at the site.
3. Demonstrate statistically significant decreasing concentrations of toluene in groundwater indicating the MCL will be met within a reasonable timeframe.

The proposed action will reduce the mass of toluene in soil. The site-specific target level, or remedial goal, for toluene in subsurface soils is 0.69mg/kg. The remedial goals for groundwater contaminants are the MCLs established under the Safe Drinking Water Act.

**Remedial Goals**

| | | |
|---|---|---|
| Toluene | Soil | 0.69 mg/kg |
| Toluene | Groundwater | 1,000 ug/L |
| cis-1,2-DCE | Groundwater | 70 ug/L |
| Benzene | Groundwater | 5ug/L |
| Vinyl Chloride | Groundwater | 2 ug/L |

## SUMMARY OF REMEDIAL ALTERNATIVES

Based on information collected during the previous investigations and remedial system operation, a Focused Feasibility Study (FFS) was conducted to identify, develop, and evaluate more effective cleanup options and remedial alternatives. Both soils and groundwater were considered in the FFS. Each remedial alternative evaluated is described briefly below. The table below briefly describes the alternatives that were identified and screened. Three alternatives were carried through to the final detailed analysis. A final Remedial Design will be developed prior to implementation.

| Alternative | Description |
|---|---|
| No Action Alternative: | Evaluated for baseline comparison only, the No Action alternative would not include any remedial or monitoring measures. Note: The No Action Alternative is not numbered herein to maintain consistency with the FFS |
| Alternative 1 :<br>Modified Air Sparging/Soil Vapor Extraction (AS/SVE); Dual Phase Extraction (DPE) | An existing AS/SVE system could be converted to a dual phase extraction (DPE) system. This modified system would work more effectively by dewatering the impacted area, thus allowing extraction of vapors. Institutional controls and groundwater monitoring would be included in this alternative. |
| Alternative 2:<br>Excavation with Biosparging and MNA | Excavation would physically remove much of the contamination. The area would be backfilled with more permeable material to allow effective delivery of air and nutrients by injection. This would stimulate biological breakdown of remaining toluene. Institutional controls and groundwater monitoring would be implemented. Monitored Natural Attenuation (MNA) would be used as a polishing technology to reach groundwater standards. |
| Alternative 3:<br>Soil Excavation with Aggressive Fluid/Vapor Recovery (AFVR) and MNA | Excavation would physically remove much of the contamination. The area would be backfilled with more permeable material and a recovery well or wells would be installed to facilitate Aggressive Fluid/Vapor Recovery. This technology uses a mobile system to extract contaminants from the subsurface. Following AFVR, groundwater and surface water would be monitored to ensure that the natural attenuation processes of biological and physical destruction, dispersion, and dilution were effective in reducing residual concentrations to below remedial action goals. Institutional controls would be implemented. Additional AFVR events could easily be implemented if needed. MNA would be used as a polishing technology to reach groundwater standards. |

## Remedial Alternatives

**No Action Alternative:**

The "No Action" alternative is required to be evaluated to establish a baseline for comparison of the other remedial action alternatives. The No-Action remedial alternative would not include any remedial measures to address the soil and groundwater contamination at the site. The No Action alternative would not achieve the Remedial Action Objectives for the site.

**Alternative 1: Modified AS/SVE; Dual-Phase Extraction (DPE)**

AS/SVE is a treatment method that involves injecting air into the groundwater through drilled wells or driven points. As the VOCs in groundwater partition into the injected air, the VOC-laden air rises to the zone above the water table where it is removed by the SVE system. This process has been in use at the Wix site since 2009, and has not been effective in achieving RAOs. The 2015 Remedial Investigation Report Addendum included an engineering evaluation of the existing system which concluded that this technology was not well suited to site conditions due to a shallow water table and low permeability of the soils. The option of modifying the existing system to a dual phase extraction system was evaluated.

The existing AS/SVE system could be modified to a dual phase extraction (DPE) system. By dewatering the impacted area, this approach would allow for more effective delivery of air, and extraction of contaminant vapors. This remedial approach would involve repair and/or replacement of damaged and malfunctioning AS/SVE equipment, installation of groundwater extraction equipment, including extraction wells, pumps, piping, and construction of a system to treat extracted groundwater prior to discharge. Groundwater would be treated using a carbon filter to remove VOCs. A treatment trailer would be built to house the water treatment equipment. This alternative would include groundwater monitoring and reporting. Recovered vapors would be treated through vapor-phase carbon filters and then discharged to the atmosphere.

**Alternative #2: Excavation followed by Biosparging and MNA**

This combined technology would begin with excavation and offsite disposal of soils saturated with toluene. The excavated area would be backfilled with gravel (in lieu of native or borrow soil) to create a highly permeable treatment zone for groundwater containing residual toluene concentrations. A biosparge system, which combines bioremediation with AS/SVE, would be installed within the gravel backfill. The biosparge system would inject both air and nutrients in to the saturated backfill, and toluene-laden air will be collected by horizontal well screens placed in the unsaturated backfill. The nutrients would stimulate the indigenous toluene-oxidizing microorganisms and migrate with groundwater flow to areas beyond the biosparge system. The biosparge system would increase the footprint of active remediation. Monitored Natural Attenuation (MNA) would also be implemented to monitor the physical, chemical, or biological reduction of residual toluene mass at the site.

**Alternative 3: Excavation followed by AFVR and MNA**

This combined technology would begin with excavation and offsite disposal of soils saturated with toluene. The excavated area would be backfilled with gravel (in lieu of native or borrow soil) to create a highly permeable treatment zone for groundwater containing residual toluene concentrations. Stockpiled clean native soil or borrow soil would be used to backfill the upper 2 feet of the excavation area (0 to 2 feet below ground surface). A 4-inch diameter extraction well would be installed within the gravel backfill for AFVR application. AFVR is a physical treatment using a truck or trailer mounted mobile high-pressure vacuum system to extract groundwater and vapors from extraction and/or monitoring wells. The extracted vapors are treated onsite using a catalytic converter on the vacuum truck prior to venting to the atmosphere, while the extracted fluid is managed within a tank and transported offsite for treatment and disposal. The AFVR technology would provide supplemental removal of toluene mass from extracted soil vapor and groundwater. An initial AFVR event would be conducted to determine the effectiveness of the technology in removing residual toluene mass. Following mass removal via excavation and AFVR, MNA would be implemented to monitor the physical, chemical, or biological reduction of residual toluene mass at the site. If monitoring indicates that MNA alone is not effective, additional AFVR events may be required.

## *EVALUATION OF ALTERNATIVES*

The National Contingency Plan requires that the Department use specific criteria to evaluate and compare the different remediation alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the criteria, noting how it compares to the other options under consideration. The criteria are:

1. Overall protection of human health and the environment;
2. Compliance with applicable or relevant and appropriate requirements (ARARs);
3. Short-term effectiveness;
4. Long-term effectiveness and permanence;
5. Reduction of toxicity, mobility, or volume through treatment;
6. Implementability;
7. Cost; and
8. Community Acceptance

The main objectives for the preferred remedial action are to be protective of human health and the environment and to comply with State and Federal regulations. These two objectives are considered threshold criteria. Threshold criteria are requirements each alternative must meet in order to be eligible for selection. For an alternative to be considered as final, these two threshold criteria must be met. The Department's remedial action must be protective of human health and the environment and comply with State and Federal standards.

The following measures are considered balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost. These criteria are used to weigh the technical feasibility, strengths and weaknesses, and cost advantages and disadvantages of each alternative.

Community acceptance is a modifying criterion that will be carefully considered by the Department prior to final remedy selection.

## *COMPARATIVE ANALYSIS OF ALTERNATIVES*

Four alternatives were retained for detailed comparative analysis:

**No Action Alternative**

**Alternative 1: Modified AS/SVE (Dual Phase Extraction)**

**Alternative 2: Excavation followed by Biosparging and MNA**

**Alternative 3: Excavation followed be AFVR and MNA**

Note: Although the No Action Alternative does not meet the threshold criteria, it is retained for discussion because it provides a baseline for comparing the other alternatives to the criteria outlined above.

The three remaining alternatives include:

The addition of institutional/engineering controls including restrictive covenants to prevent installation of any on-site water supply wells, maintenance of fencing and access controls, and; long-term monitoring, with the monitoring scope, frequency and duration to be determined during the remedial design phase.

**Overall protection of human health and the environment**

The No Action Alternative would not be protective of human health and the environment. Potential for exposure of plant employees and on-site construction workers to contaminants would remain.

Alternative 1 would protect human health and the environment by mitigating exposures to contaminated soil and groundwater through deed restrictions and continued use of municipal water as a water supply source. Restoration of the impacted groundwater would also be achieved over time. Energy consumption and waste generation would be relatively high due to mechanical processes applied over the lifetime of the remedy. Based on the data gathered during operation of the existing AS/SVE system, it is anticipated that the modified system would operate for 15-20 years and have a limited radius of influence. During this time, waste streams generated would include treated groundwater and spent carbon vessels (estimated 4,000 lbs. /year).

Alternative 2 would also protect human health and the environment by mitigating exposures to contaminated soil and groundwater through deed restrictions and continued use of municipal water as a water supply source. Restoration of the impacted groundwater would also be achieved over time. Excavation would initially remove contaminant mass rapidly. Biosparging would provide ongoing active treatment. Excavation would generate about 700 tons of contaminated soil for transportation and disposal as hazardous waste. About 3,000 gallons of waste liquids are anticipated to be generated during excavation, and will require treatment and disposal. Spent carbon vessels would also need to be disposed and replaced during operation of the biosparge system, at about half the rate of the modified AS/SVE system.

Alternative 3 would protect human health and the environment by mitigating exposures to contaminated soil and groundwater through deed restrictions and continued use of municipal water as a supply source. Restoration of the impacted groundwater would also be achieved over time. Excavation would rapidly remove contaminant mass. Additional protection would be attained through AFVR events which would remove additional contaminant mass quickly. Waste generation would include 700 tons of grossly contaminated soil to be disposed as hazardous waste, 3,000 gallons of waste liquids to be generated during excavation, and any fluids removed during AFVR events. Although significant volumes of fluids would be removed by AFVR, events would be infrequent and of limited duration. Waste materials would be transferred directly to the mobile equipment for disposal eliminating regular handling and long-term accumulation of waste materials associated with the biosparging or AS/SVE.

Overall protection of human health and the environment is highest for Alternative 3.

**Compliance with applicable or relevant and appropriate requirements (ARARs)**

ARAR's to be addressed by the selected remedy include compliance with South Carolina Groundwater Classifications and Standards. This means that all groundwaters of the state are considered Class GB or potential sources of drinking water. Therefore, the USEPA maximum contaminant levels, or MCLs are applicable.

The No Action Alternative would not achieve compliance with MCLs in a reasonable time frame because no action would be taken.

Alternative 1 would address this requirement through active treatment, but would require significant time to reach MCLs even within the radius of influence of the extraction system. Concentrations in the distal portions of the plume will eventually decrease, but contaminant mass would remain in the source area for some time. Additional ARARs to be addressed include permitting for construction of the DPE system, and for discharge of treated water, and potentially for treated vapors.

Alternatives 2 would achieve groundwater quality standards more quickly by removing a significant amount of contaminant mass through excavation. This would be followed by in-situ active treatment. Passive remediation by indigenous microbes would be necessary to meet MCLs in the distal portions of the contaminant plume. Monitoring would be conducted to ensure that MNA is effective in meeting MCLs. Permitting for injection of nutrients and other amendments would be required, and a permit for discharge of treated vapor may be required.

Alternative 3 would address the groundwater quality standards through the initial removal event followed by additional fluid recovery events as needed to ensure that source area contamination does not serve as a long-term source of contaminants to the distal portions of the contaminant plume. Passive remediation by indigenous microbes would be necessary to meet MCLs in the distal portions of the contaminant plume. Monitoring would be conducted to ensure that MNA is effective in meeting MCLs. Well construction standards and regulations would apply to installation of recovery wells. Transportation and disposal requirements would have to comply with applicable regulations. Compliance with ARARs is roughly equivalent for alternatives 1, 2, & 3.

**Long-term effectiveness and permanence**

This criterion considers the magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities, as well as the adequacy and reliability of controls such as containment systems and institutional controls.

The No Action Alternative is ineffective in that no reduction in contaminant mass would be effected, and no institutional controls would be implemented. Alternatives 1, 2 & 3 are rated "Moderate" for Long-term effectiveness and permanence.

Alternatives 1, 2 & 3 would utilize institutional and engineering controls to reduce long-term risk from exposure to residual contamination.

Alternatives 2 & 3 would further reduce risks by initially removing a significant amount of contaminant mass through excavation. Alternatives 1 & 2 utilize active treatment systems that could breakdown and require repair or replacement of components during the life of the remedy.

Alternative 3 also utilizes active treatment, but through mobile systems that are contracted as needed. This ensures that remediation equipment will function as intended. Recovery wells may require replacement, but the likelihood of this can be reduced through proper construction materials and techniques.

**Reduction of toxicity, mobility, or volume through treatment**

The No Action Alternative would not reduce contaminant toxicity, mobility or volume.

Alternative 1 would provide moderate reduction in contaminant toxicity, mobility and volume through active treatment. DPE mobilizes VOCs by stripping them from formation materials and capturing them. Captured vapors would be treated through an activated carbon filter, thus immobilizing contaminants for later disposal.

Alternatives 2 & 3 would provide greater reduction of contaminant volume through direct physical removal of toluene saturated soil and groundwater. Toxicity of the material itself would not be reduced, however it would be transported to an appropriately engineered and permitted disposal facility, thus reducing mobility and the potential for exposure to human or ecological receptors.

Alternative 2 would reduce the toxicity of residual toluene by providing nutrients that would facilitate biological breakdown. The associated SVE system would capture mobilized VOCs and treat them through an activated carbon filter, thus immobilizing them. Contaminant volume would be reduced over time.

Alternative 3 would treat extracted vapors catalytically, reducing toxicity. Captured liquids would be transported to a permitted treatment and disposal facility. This technology can reduce contaminant volume permanently by physical removal from the site.

MNA associated with alternatives 2 & 3 would further reduce contaminant toxicity, mobility and volume through metabolic breakdown. Alternatives 2 & 3 are rated "high" for this criterion.

**Short-term effectiveness**

Short-term effectiveness considers potential impacts to human health and the environment during implementation, and time required to reach remedial action objectives.

The No Action Alternative would not involve any construction or remedial action, and so would not create any new risks. However, the potential for site worker exposure to contaminants would remain. The No Action alternative would not be expected to achieve RAOs.

Alternatives 1, 2 & 3 would present some risk to workers through potential incidental ingestion, dermal contact, and inhalation of VOCs during construction, remediation and monitoring activities. Noise from the treatment units could present some limited adverse impacts to onsite workers and nearby businesses. Risks could be minimized by following appropriate health and safety protocols, exercising sound engineering practices and utilizing proper PPE.

Alternatives 2 & 3 would present some risk to workers through potential incidental ingestion, dermal contact, and inhalation of VOCs during excavation and transportation of contaminated media. Alternative 2 would also involve additional risk from excavation shoring and construction of the biosparging system. These risks could be minimized by following appropriate health and safety protocols, exercising sound engineering practices and utilizing proper PPE.

Alternative 3 would present less short-term risk as operation of AFVR would only be conducted periodically as needed.

Achievement of RAOs would require 15- 20 years for Alternative 1, based on permeability of soils. Alternative 2 is estimated to require 5-10 years to reach RAOs. Alternative 3 is estimated to require 7-10 years to achieve RAOs.

The short-term effectiveness of the No Action Alternative is low. Short- term effectiveness is moderate for Alternatives 1, 2 & 3.

**Implementability**

The No Action Alternative is easily implementable.

Alternatives 1 would require a pre-design study to calculate system requirements. Malfunctioning components of the existing SVE system would need to be replaced. Installation of associated transfer pipelines and wells, and new water treatment equipment would be required. Long-term operation, maintenance and monitoring would be required. This alternative was rated "moderate" for implementability.

Alternative 2 would also require a pre-design study to design an excavation and shoring system, selection of appropriate nutrients for the biosparge system, replacement of malfunctioning components of the existing system, and installation of associated transfer pipelines and wells. Long-term operation, maintenance and monitoring would be required. This alternative was rated "low" for implementability.

Alternative 3 would require excavation and installation of an appropriately designed extraction well. Because the extraction well can be installed after the excavation is backfilled, no work would be conducted in the excavation. Therefore shoring would not be needed. Equipment used for AFVR events is mobile and readily available. Implementability for Alternative 3 is rated as "high."

**Cost**

The cost criterion includes estimated initial capital costs and annual Operation and Maintenance (O&M) costs, as well as a net present value cost evaluation. Net present value cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of -30% to +50%. Estimates were calculated for the expected minimum and maximum number of years of O&M.

Costs were not calculated for the No Action Alternative, as no response actions are associated with this alternative.

Alternative 1, modified AS/SVE has the lowest capital cost, at $206,000. Annual O&M costs are estimated at $107,000, with a range of 15-20 years. The maximum net present value is $1,940,000

Alternative 2, excavation with biosparging and MNA has the highest capital cost at $545,000. Annual O&M costs are $102,000, with a range of 5-10 years of anticipated operation. The maximum net present value is $1,449,000.

Alternative 3, excavation followed by AFVR has a capital cost of $398,000. Annual O&M costs are $45,000, with a range of 7-10 years of anticipated operation. The maximum net present value of this alternative is $797,000.

**Community Acceptance**

Community acceptance of the preferred remedy will be evaluated after the public comment period. Public comments will be summarized and responses provided in the Responsiveness Summary Section of the Record of Decision document that will present the Department's final alternative selection. The Department may choose to modify the preferred alternative or select another remedy based on public comments or new information.

## SUMMARY OF THE DEPARTMENT'S PREFERRED ALTERNATIVE

The Department has identified Alternative 3 as the preferred alternative to address soil and groundwater contamination at the Site. The preferred alternative consists of the following components:

- Excavation of source area soils to remove the principal source of contamination;
- Backfilling of the excavation with more permeable fill material that will allow contaminated groundwater to flow back into to the excavated area;
- Installation of a large diameter recovery well to facilitate aggressive fluid/vapor recovery (AFVR);
- Implementation of AFVR to remove additional contaminant mass;
- Natural attenuation monitoring to ensure that remaining contaminant mass is permanently destroyed and that groundwater will reach remedial goals in a reasonable time frame;

The total estimated net present value of this alternative is approximately $797,000.

The Department expects the Preferred Remedy to satisfy the following statutory requirements: 1) be protective of human health and the environment; 2) comply with applicable or relevant and appropriate requirements; 3) be cost-effective; 4) utilize permanent solutions to the maximum extent practicable; and 5) satisfy the preference for treatment as a principle element of the remedy.

**USE THIS SPACE TO WRITE YOUR COMMENTS**

Your input on the Proposed Plan for the Wix Filtration Corp (Wix) Site is important. Comments provided by the public are valuable in helping DHEC select a final cleanup remedy.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by **May 26, 2018**. If you have any questions, please contact Tim Hornosky, at 803-898-0733. You may also submit your questions and/or comments electronically to: hornostr@dhec.sc.gov.

Name ______________________ Telephone ______________________

Address ______________________ Email ______________________

City ______________ State ___ Zip ________

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**Sent:** Friday, May 25, 2018 11:25 AM
**To:** Hornosky, Tim
**Cc:** Guiles, Brandon; Paul.Caulford@mann-hummel.com; Karen.Swaback@mann-hummel.com; Weston Adams; Jim Hiller (Jim.Hiller@erm.com) (Jim.Hiller@erm.com); Kretschman, Steve J.; Robertson, Pam; Charles.Emanuelli@mann-hummel.com
**Subject:** WIX-Dillon Site: Comments on April 26, 2018, Proposed Plan for Cleanup

Tim-

WSP USA Inc. (WSP), on behalf of MANN + HUMMEL Filtration Technology US LLC (formerly WIX Filtration Corp LLC), has reviewed the Proposed Plan for Site Remediation at the WIX Dillon Site, issued for public comment by the South Carolina Department of Health and Environmental Control (DHEC) in April 26, 2018. The Proposed Plan identifies DHEC's preferred alternative for site remediation, and provides a public comment period on the Proposed Plan through May 26, 2016. Based on our review of the Proposed Plan, WSP provides the following comments to be included in the public comment record.

1. The components of DHEC's Preferred Cleanup Summary identified in the Proposed Plan are consistent with Alternative 3, the recommended alternative in WSP's June 24, 2016, Focused Feasibility Study Report (FFS Report). WSP notes that the design of these components will be specified for DHEC's review in a Remedial Design Plan, and will be based on 1) appropriateness given the nature and extent of contamination, and 2) the remedial action objectives provided in the FFS Report.

2. The Proposed Plan does not identify any exposure risk from surface soils or surface water. Therefore, the engineering controls will be limited to those applicable while an exposure risk to impacted subsurface media is present, such as sediment and erosion controls during excavation activities and vapor controls during aggressive fluid/vapor recovery events.

3. The Summary of Site Risks in the Proposed Plan states that the total excess cancer risk to facility workers from vapor intrusion due to inhalation was $2.01 \times 10^{-6}$, which falls slightly above the lower limit of the U.S. Environmental Protection Agency (EPA) "risk management range" ($1 \times 10^{-6}$ to $1 \times 10^{-4}$). The risk assessment for vapor intrusion, provided to DHEC in WSP's September 2015 RI Report Addendum, was based on 13 sub-slab vapor (SSV) samples collected in 2014 and 2015. The Proposed Plan states "the Department has determined that sub-slab vapor sampling should be incorporated into the site monitoring program."

   WSP's RI Report Addendum concluded that the "potential risks posed by the vapor intrusion exposure pathway at the Wix facility are within EPA's acceptable excess cancer risk range, and no adverse non-cancer health effects are likely associated with potential exposures to constituents of potential concern in indoor air by vapor intrusion". DHEC's October 2015 review letter for the RI Report Addendum did not provide any comments on the need to perform vapor monitoring during future activities. Based on the lack of DHEC comments and the site's risk level falling slightly above the lower limit of the EPA risk management range, the inclusion of this monitoring activity in the Proposed Plan is both unexpected and unnecessary.

WSP and MANN + HUMMEL have reservations about the utility of additional vapor sampling. If, however, after reviewing the above comments, DHEC still requires additional sampling, MANN + HUMMEL is willing to develop and implement a limited SSV monitoring program pursuant to DHEC's request in the Proposed Plan. The monitoring program would be sufficient to determine whether residual volatile organic compounds would pose a potential health concern to facility workers. The details of the SSV monitoring program would be submitted to DHEC for review prior to implementation.

Respectfully submitted,
R. Eric Johnson

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